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# *Public Groundwater Supplies in Will County*

by DOROTHY M. WOLLER and ELLIS W. SANDERSON

ILLINOIS STATE WATER SURVEY

CHAMPAIGN

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# PUBLIC GROUNDWATER SUPPLIES IN WILL COUNTY

by Dorothy M. Woller and Ellis W. Sanderson

## Introduction

This publication presents all available information on production wells used for public water supplies in Will County. Bulletin 60, which is divided by county into separate publications, supersedes Bulletin 40 and its Supplements 1 and 2.

The definition of public water supply as contained in the Environmental Protection Act of 1970 was used to determine those water systems and wells to be included. Systems and wells described furnish water for drinking or general domestic use in: 1) incorporated municipalities; 2) unincorporated communities where 10 or more separate lots or properties are being served or are intended to be served; 3) state-owned parks and memorials; and 4) state-owned educational, charitable, or penal institutions.

This report includes separate descriptions for 70 public water supply systems furnishing water to 22 municipalities, 43 subdivisions, 3 state institutions, 2 state parks, and 1 university in Will County. These are preceded by brief summaries of the groundwater geology of the county and the development of groundwater sources for public use. An explanation of the format used in the descriptions is also given.

**Acknowledgments.** This report was prepared under the general direction of Stanley A. Changnon, Jr., Chief of the Illinois State Water Survey, and James P. Gibb, Head of the Groundwater Section. Special thanks are given to R. T. Sasman, Hydrologist, who checked all of the data and reviewed the manuscript. Mrs. J. L. Ivens edited the manuscript, Mrs. Marilyn J. Innes typed the camera-copy, and John W. Brother, Jr. supervised the preparation of the illustrations. The chemical analyses, unless otherwise stated, were made by personnel of the Water Survey Analytical Chemistry Laboratory under the supervision of Laurel M. Henley (now retired) and James C. Whitney. The analyses made by personnel of the Illinois Environmental Protection Agency were under the supervision of Ira M. Markwood. Thanks are due M. L. Sargent of the Illinois State Geological Survey who prepared the generalized column of rock stratigraphic units and aquifers and, with R. D. Brower, reviewed the geological information in the manuscript. Grateful acknowledgment also is given to consulting engineers, well drillers, water superintendents, and municipal officials who have provided valuable information used in this report.

## Groundwater Geology

The geology of Will County is described in Illinois State Geological Survey Circular 198, *Groundwater Possibilities in Northeastern Illinois*; Circular 406, *Bedrock Aquifers of Northeastern Illinois*; Report of Investigation 218, *Cambrian and Ordovician Strata of Northeastern Illinois*; and Illinois State Water Survey and State Geological Survey Cooperative Ground-Water Report 1, *Preliminary Report on Ground-Water Resources of the Chicago Region, Illinois*. The following brief discussion of geologic conditions in the county is taken largely from these publications. More detailed information on the geology in this portion of the state can be obtained from the State Geological Survey which is located on the University of Illinois Urbana campus.

The glacial drift deposits in Will County vary in thickness from less than 1 ft along the Des Plaines and Kankakee Rivers, where bedrock is exposed, to more than 200 ft near the stair-stepped northeast border. Sand and gravel deposits offering possibility for the development of small to moderate quantities of water (10 to 100 gpm) from individual wells are present within the glacial drift in more than half of the county. Northeast of Joliet a preglacial bedrock valley contains thick deposits of sand and gravel that have been developed for a portion of the supply for Joliet. Individual wells are pumped at rates of about 600 to 1000 gpm.

Beneath the glacial deposits throughout most of the county, dolomite (a limestone-like rock) of Silurian age

occurs at the bedrock surface. The exception to this is where Pennsylvanian and Ordovician age rocks dominated by shale occur at the bedrock surface in the area south from Highway 52 to the south county line and extending about 1 to 10 miles from the west county line. The regional dip of these strata is easterly at 10 to 25 ft per mile. Bedrock formations underlying Will County range in age from Pennsylvanian to Precambrian (see generalized stratigraphic sequence in figure 1). In the central western area of this county, there is a small vertical dislocation of the rock units along the Sandwich Fault which consists of several northwesterly trending faults.

Pennsylvanian-age rock units underlie the glacial drift in about 35 square miles at the southwest corner of the county in the vicinity of Braidwood. In this area the Silurian dolomite was removed by erosion and the Pennsylvanian units rest unconformably upon older rock units of the Ordovician age Maquoketa Group. The Pennsylvanian rock units range in thickness from a featheredge where they have been eroded to a maximum of about 110 ft. These rocks consist principally of shale and are not regarded as water yielding in this area.

The Silurian dolomite that underlies the glacial drift in most of Will County (see figure 2) is part of the geohydrologic system present throughout northeastern Illinois that is referred to as the shallow dolomite aquifer system. These rocks are encountered at land surface near the Des Plaines River and along portions of the Kankakee River and are buried to a depth of more than 200 ft in some places along the stair-stepped northeast county line. They range in thickness from a featheredge in the southwest to about 300 ft northeast of Joliet to more than 450 ft along the far east edge of the county. Erosion has removed the Silurian dolomite southwest of Joliet along the west county line in a 1- to 10-mile-wide band arcing across the southwest part of the county through Wilmington. There the underlying Maquoketa Group forms the upper bedrock surface except where it is covered by Pennsylvanian units. The yield capability of the Silurian rocks depends primarily upon the number, size, and degree of interconnection of water-filled cracks and crevices within the rock that are penetrated by a well bore. The development of such cracks and crevices and the resulting yield capability of this aquifer are enhanced in some areas where permeable deposits of water-bearing sand and gravel in the overlying drift contribute substantial amounts of water.

The Maquoketa Group (Ordovician age) underlies the Silurian dolomite in most of Will County and is beneath the glacial drift in that part of southwest Will County where the Silurian dolomite and Pennsylvanian rocks are absent. It consists primarily of nonwater-bearing shales that separate the Silurian aquifer from deeper water-bearing units. These shales generally lie at depths from about 50 ft in areas in the southwestern part of the county to more than 500 ft in

the eastern part of the county. However, these Maquoketa rocks are locally exposed at the land surface along portions of the Kankakee and Des Plaines Rivers. The Maquoketa ranges in thickness from less than 100 ft west of Joliet to about 250 ft in the southeast corner. The Maquoketa Group generally is not considered as a source for moderate to large water supplies. Locally, supplies adequate for small subdivisions and domestic use are obtained from systems of cracks and crevices in the more dolomitic part of these rocks.

Below the Maquoketa Group occurs a thick sequence of hydrologically connected rocks that are referred to as the Cambrian-Ordovician aquifer system. This aquifer system consists in downward order of the Galena and Platteville Dolomite Groups, Glenwood-St. Peter Sandstone, Prairie du Chien Group, Eminence-Potosi Dolomite, Franconia Formation, and Ironton-Galesville Sandstone.

Dolomite of the Galena-Platteville (Ordovician age) lies at depths that range from approximately 400 ft in northwestern Will County to about 850 ft in the eastern area. In the southwest portion of the county south of the Sandwich Fault, it is as shallow as 150 ft. It is relatively uniform in thickness throughout the county ranging from about 310 to 380 ft. Water from this aquifer is obtained from cracks and crevices so that the yield of individual wells depends primarily upon the number, size, and degree of interconnection of the crevices intersected by a well bore.

The Glenwood-St. Peter Sandstone (Ordovician age) lies below the Galena-Platteville. This sandstone aquifer is encountered at depths from about 650 ft in the northwest part of the county to about 600 ft in the southwest area south of Wilmington and reaches a maximum of 1250 ft at the southeast corner. It ranges in thickness from about 125 to 200 ft in most of the county east and south of Joliet to as much as 600 ft in a generally north-south trending band that passes beneath Joliet. It is estimated that the Galena-Platteville and the Glenwood-St. Peter produce about 15 percent of the total potential yield from the Cambrian-Ordovician aquifer system.

Below the Glenwood-St. Peter lie the Prairie du Chien Group (Ordovician age), Eminence-Potosi Dolomite (Cambrian age), and the Franconia Formation (Cambrian age) which consists of interbedded sandstones, shales, and dolomites. These units are encountered at depths of about 800 to 900 ft in western Will County to a maximum of about 1400 ft northwest of Joliet and at the southeast corner of the county and beneath the thick St. Peter Sandstone northeast of Joliet. These units have total thicknesses varying from about 450 ft to more than 800 ft except in the area northeast of Joliet where the thickness may be reduced to about 110 ft. The shales and dolomites yield small quantities of water, but the sandy parts of these formations may contribute moderate quantities of water to wells where they are not cased off by liners. It is estimated that these formation produce about 35 percent of the total yield from

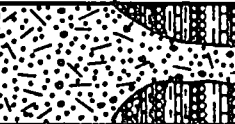



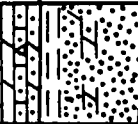
SYSTEM	SERIES	GROUP OR FORMATION	AQUIFER	LOG	THICKNESS (FT)	DESCRIPTION
QUATERNARY	PLEISTOCENE		Sands and Gravels		0 - 250	Unconsolidated glacial deposits-pebbly clay (fill), silt, sand and gravel Alluvial silt and sands along streams
					0 - 110	Shale, sandstone, clay, limestone, and coal
PENNSYLVANIAN	DES MOINESIAN	Spoon and Carbondale	Shallow dolomite aquifer system		ref	Dolomite, very pure to argillaceous, silty, cherty; reefs in upper part Dolomite, slightly argillaceous and silty Dolomite, very pure to shaly and shale, dolomitic; white, light gray, green, pink, maroon
					0 - 350	
					0 - 100	Dolomite, pure top 1' - 2', thin green shale partings, base glauconitic Dolomite, slightly argillaceous, abundant layered white chert Dolomite gray, argillaceous and becomes dolomitic shale at base
					80 - 250	Shale, red to maroon, coillies Shale, silty, dolomitic, greenish gray, weak (Upper unit) Dolomite and limestone, white, light gray, interbedded shale (Middle unit) Shale, dolomitic, brown, gray (Lower unit)
ORDOVICIAN	CINCINNATIAN	Maquoketa	Shallow dolomite aquifer system		310 - 380	Dolomite, and/or limestone, cherty (Lower part) Dolomite, shale partings, speckled Dolomite and/or limestone, cherty, sandy at base
					125 - 600	Sandstone, fine and coarse grained; little dolomite; shale at top Sandstone, fine to medium grained; locally cherty red shale at base
					0 - 410	Dolomite, sandy, cherty (oolitic); sandstone Sandstone interbedded with dolomite Dolomite, white to pink, coarse grained cherty (oolitic) Sandstone, medium-grained, slightly dolomitic
					0 - 200	Dolomite, light colored, sandy, thin sandstones Dolomite, fine-grained, gray to brown, drusy quartz
CAMBRIAN	CANADIAN	Shelkops, New Richmond, Oneota, Guntur	Cambrian-Ordovician aquifer system		110 - 160	Dolomite, sandstone and shale, glauconitic, green to red, micaceous
					135 - 235	Sandstone, fine to coarse grained, well sorted; upper part dolomitic
					390 - 570	Shale and siltstone, dolomitic, glauconitic; sandstone, dolomitic, glauconitic
					2200	Sandstone, coarse grained, white, red in lower half; lenses of shale and siltstone, red, micaceous
PRE-CAMBRIAN						Granitic rocks

Figure 1. Generalized column of rock stratigraphic units and aquifers in Will County  
(Prepared by M. L. Sargent, Illinois State Geological Survey)

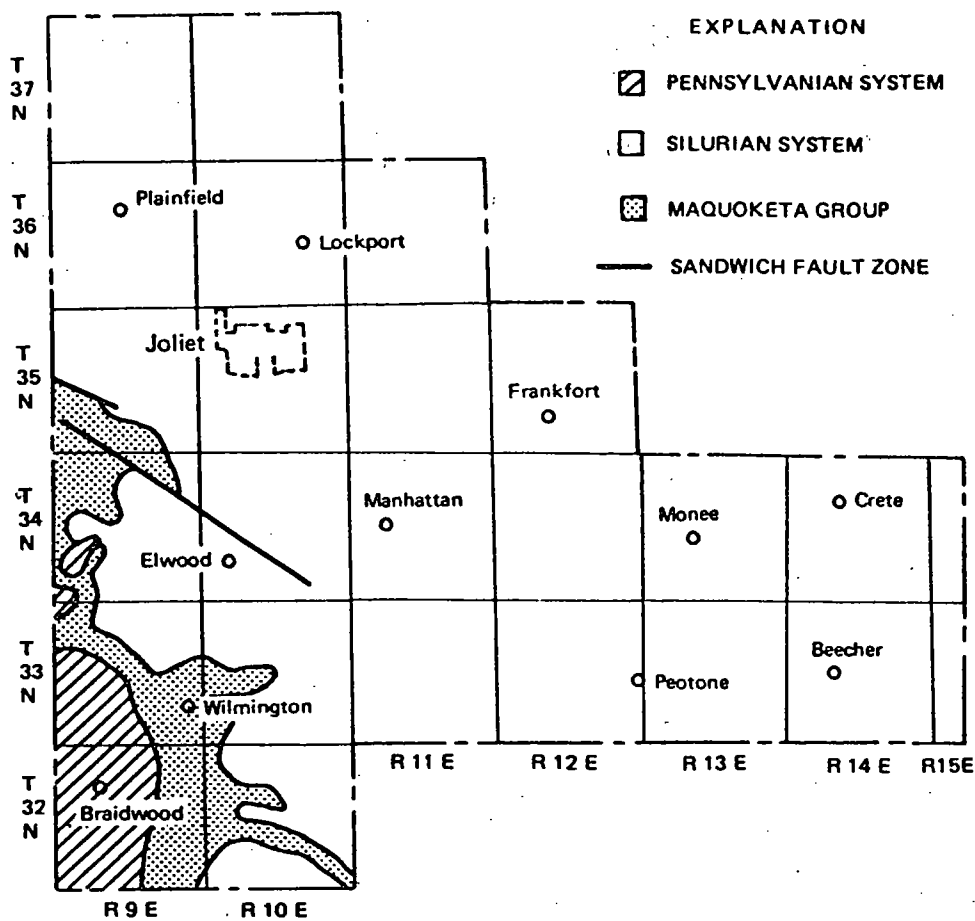


Figure 2. Areal geology of the bedrock surface  
(Modified from *Geologic Map of Illinois*, Willman and others, 1967)

the Cambrian-Ordovician aquifer system. Wells tapping only these rock units are seldom constructed.

The Ironton-Galesville Sandstone (Cambrian age) is the most consistently permeable and productive unit of the Cambrian-Ordovician aquifer system in northeastern Illinois. It is usually about 175 to 200 ft thick in Will County. Its top occurs at a depth of about 1300 ft in the northwest part, is about 1550 ft deep in the southwest near Wilmington, and reaches a maximum of about 1950 ft in the southeast corner. It is estimated that this unit produces about 50 percent of the total yield of the Cambrian-Ordovician aquifer system.

Below the Ironton-Galesville Sandstone lies the Eau Claire Formation. The upper and middle parts of the Eau Claire contain numerous beds of nonwater-yielding shale that separate the Cambrian-Ordovician aquifer from the deeper aquifer. The Elmhurst Sandstone Member at the base of the Eau Claire Formation and the underlying Mt. Simon Sandstone are hydrologically connected and form the Elmhurst-Mt. Simon aquifer system, the deepest fresh water aquifer in northern Illinois. In Will County this aquifer

lies at depths ranging from about 1900 ft in the northwest to more than 2650 ft in the southeast and ranges in thickness from about 2800 ft in the west-central part to about 2500 ft in the east-central part of the county. Water wells usually penetrate only a few hundred feet into this aquifer because the quality of the water deteriorates with depth. Water obtained below an elevation of about 1300 ft below sea level is generally too highly mineralized for domestic use.

### Groundwater Development for Public Use

Groundwater is used as a source of public water supply at 22 municipalities, 43 subdivisions, 3 state institutions, 2 state parks, and 1 university in Will County. The locations of these supplies are shown in figure 3.

Sand and gravel deposits in the unconsolidated materials above bedrock are tapped by only one public water supply system in Will County. This is at Joliet where a part of their supply is obtained from 5 production wells located near Spring Creek about 4 to 5 miles northeast of the city. These

- 1 - Balmoral Heights Subdivision
- 2 - Beckwith Subdivision
- 3 - Beecher
- 4 - Bel-Air Subdivision
- 5 - Bolingbrook
- 6 - Bolingbrook (Citizens West Suburban)
- 7 - Bonnie Brae-Forest Manor Sanitary District
- 8 - Braidwood
- 9 - C and G Maintenance Corporation
- 10 - Camelot Utilities, Inc.
- 11 - Central States Utility Co.
- 12 - Channahon
- 13 - Channahon Parkway State Park
- 14 - Cherry Hill Subdivision
- 15 - Chickasaw Hills Utility Co., Inc.
- 16 - Citizens Arbury Division
- 17 - Clearview Subdivision
- 18 - College View Subdivision
- 19 - Crest Hill
- 20 - Crete
- 21 - Crystal Lawns Subdivision
- 22 - Derby Meadows Utility Co., Inc.
- 23 - Dixie Dells Subdivision (Willowbrook Utility Co.)
- 24 - Dixie Estates Subdivision
- 25 - East Lawn Subdivision
- 26 - East Moreland Water Association
- 27 - East Moreland Water Corp. (Feil Water Treatment)
- 28 - Elwood
- 29 - Fair Acres Subdivision
- 30 - Frankfort
- 31 - Frankfort Square Subdivision
- 32 - Governor's State University
- 33 - Greenfield Community Well Co.
- 34 - Hill View Subdivision
- 35 - Huntley Terrace Subdivision
- 36 - Illinois Youth Center (Kankakee School Camp)
- 37 - Ingall's Park Subdivision
- 38 - Joliet
- 39 - Joliet Correctional Center
- 40 - Kankakee River State Park
- 41 - Lakeview Improvement Association
- 42 - Lakewood Shores Improvement Association
- 43 - Lockport
- 44 - Lockport Heights Sanitary District
- 45 - Lockport Township Water System
- 46 - Manhattan
- 47 - Minooka
- 48 - Mokena
- 49 - Monee
- 50 - New Lenox
- 51 - Oak Valley Subdivision
- 52 - Oakview Avenue Waterworks, Inc.
- 53 - Park Forest South Utility Co.
- 54 - Park Road Water Association
- 55 - Peotone
- 56 - Plainfield
- 57 - Preston Utility Co.
- 58 - Prestwick Utility Co.
- 59 - Ridgewood Subdivision
- 60 - Rockdale
- 61 - Romeoville
- 62 - Shawnta Terrace Water Association
- 63 - Shorewood (Brook Forest Subdv)
- 64 - Shorewood (Oakwood Manor Subdv)
- 65 - Stateville Correctional Center
- 66 - Steger
- 67 - Sunnyland Subdivision
- 68 - Sunset Trails Apartments
- 69 - Utilities, Unlimited
- 70 - Willow Brook Utility Co.
- 71 - Wilmington

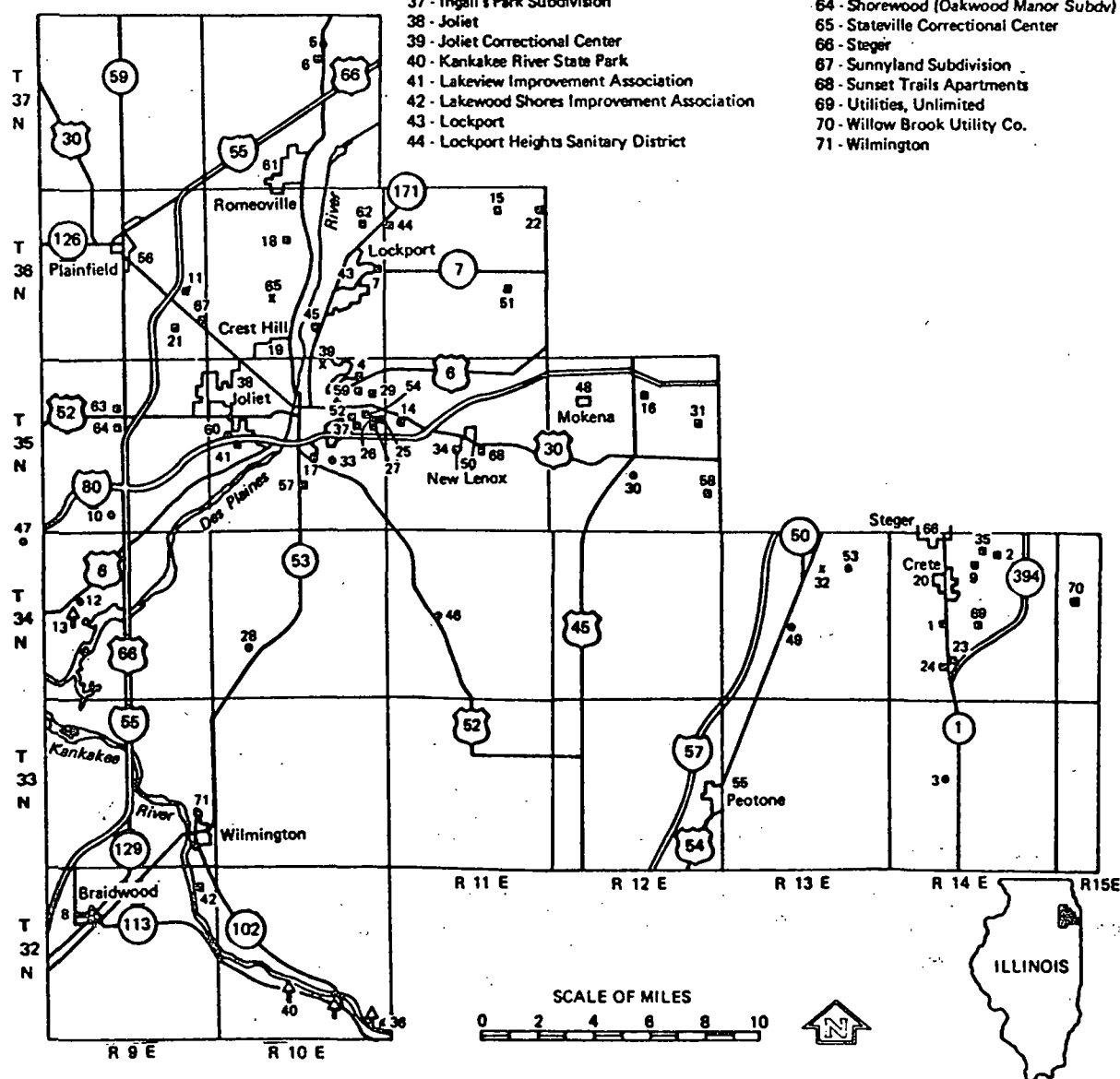


Figure 3. Location of public groundwater supply systems in Will County

wells range in depth from 83 to 113 ft and yield from 600 to 1200 gpm depending upon the permeability and thickness of the sand and gravel unit at each well site. Production from these wells for 1980 was reported to be 3,364,000 gpd.

The analyses of water from these wells show that the iron content usually ranges from 0.7 to 4.0 mg/l, sulfates from 156 to 418 mg/l, hardness from 387 to 738 mg/l, and the total dissolved minerals from 415 to 925 mg/l. Water from the sand and gravel deposits at Joliet is chlorinated, filtered, and treated with polyphosphate to keep iron in solution.

The upper bedrock units in Will County, the Silurian dolomite and the Maquoketa Group, are tapped by 58 public water systems as a source of all or a portion of their water supply. There are presently 118 production and standby wells finished only in these units. They range in depth from 102 to 570 ft and are pumped at rates of 7 to 2400 gpm. The yield of an individual well depends primarily on the thickness of the aquifer and the number, size, and degree of interconnection of the crevices intersected by the well bore. Withdrawals from the upper bedrock units for 1980 were estimated to be about 12,300,000 gpd.

Analyses of water from wells tapping only the upper bedrock units show that the iron content usually ranges from 0.0 to 4.4 mg/l, sulfates from 10 to 870 mg/l, hardness from 234 to 1288 mg/l, and the total dissolved minerals from 388 to 1581 mg/l. The barium content of water from 1 well was 1.1 mg/l. Hydrogen sulfide gas was also noted in water from 1 well. Treatment provided at the 58 supply systems is as follows: 50 chlorinate, 42 fluoridate, 1 aerates, 1 treats with sodium silicate, 2 filter, 1 softens, 19 add polyphosphate to keep iron in solution, and 8 provide no treatment.

Wells tapping combinations of formations within the Cambrian-Ordovician aquifer system are used at 15 public water systems as a source of all or a part of their water supply. There are presently 39 production and standby wells, ranging in depth from 440 to 1733 ft, finished within the Cambrian-Ordovician aquifer system. These wells are pumped at rates of 23 to 1980 gpm. Production from these wells for 1980 was estimated to be about 15,481,000 gpd.

The analysis of water from these wells show the iron content usually ranges from 0.0 to 1.2 mg/l, fluoride from 0.3 to 2.5 mg/l, chlorides from 15 to 320 mg/l, sulfates from 33 to 500 mg/l, hardness from 100 to 565 mg/l, and the total dissolved minerals from 351 to 1460 mg/l. Hydrogen sulfide gas was also noted in water from 3 wells. Water treatment for these supplies is as follows: 15 chlorinate, 1 adds fluoride, 1 aerates, 1 filters, and 3 add polyphosphate to keep iron in solution.

Throughout most of northeastern Illinois the Cambrian-Ordovician aquifer system has been overdeveloped resulting in marked declines in water levels in this aquifer. In Will

County water levels have declined at an average rate of 14 ft per year for the period 1971 to 1975 and about 6 ft per year for the period 1975 to 1980.

The total public water supply pumpage from the aquifers in Will County for 1980 was about 31,155,000 gpd. Of this total approximately 11 percent was obtained from sand and gravel aquifers, 39 percent from the Silurian dolomite and Maquoketa Group, and 50 percent from combinations of formations within the Cambrian-Ordovician aquifer system.

## Format

In this publication the descriptions of public water supplies are presented in alphabetical order by place name.

At the beginning of each description the U. S. Census of population for 1970 is given for incorporated places. For unincorporated places, the population is estimated on the basis of the number of services or residential units and an assumed number of 3.5 persons per service.

The number of services and quantity of water distributed at each supply are given where available for the earliest and the latest reported values.

Individual production wells for each supply are described in the order of their construction. The description for each well includes the *aquifer or aquifers tapped, date drilled, depth, driller, legal location, elevation in feet above mean sea level, log, construction features, yield, pumping equipment, and chemical analyses.*

When available, sample study logs prepared by the Illinois State Geological Survey are presented. When these are not available, drillers logs are used as reported. Commonly used drillers terms such as clay, silt, or pebbly clay generally are synonymous with the glacial tills tabulated by the State Geological Survey. Similarly, limestones or dolomites reported by drillers usually are carbonate rocks which in most of Illinois are dolomitic in composition. When stating the bedrock aquifers tapped by a well, the sample study log provided by the State Geological Survey and the drillers casing record are used to determine the geohydrologic units open to the hole. If only a drillers log is available and the geohydrologic units cannot be readily determined, only the principal rock type as described by the driller is given (dolomite, sandstone, etc.).

The screen sizes given in this publication are for continuous slot type screens unless stated otherwise. Slot sizes given indicate the width of the slot openings in thousandths of an inch. For example, a 20 slot screen has slot openings 0.020 in. wide and a 100 slot screen has slots 0.100 in. wide. Approximate equivalent slot openings for other types of screens are given in parentheses after the screen description.

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A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B31484) of a sample collected December 29, 1980, showed the water to have a hardness of 430 mg/l, total dissolved minerals of 497 mg/l, and an iron content of 0.006 mg/l.

WELL NO. 3, open to the Silurian dolomite, was completed in September 1962 to a depth of 327 ft by Dreher & Schorie, Joliet. The well is located at Terminal Court and Dawson Drive, approximately 1250 ft N and 50 ft W of the SE corner of Section 9, T36N, R10E. The land surface elevation at the well is approximately 680 ft.

A 6-in. diameter hole was drilled to a depth of 327 ft. The well is cased with 6-in. pipe from 1.3 ft above the 4-ft deep pumphouse floor to a depth of 42 ft.

Upon completion, this well was reportedly acidized by the driller and a test showed it could produce 60 gpm.

In 1968, the nonpumping water level was reported to be 50 ft.

On February 12, 1976, the well reportedly produced 60 gpm for 15 min with a drawdown of 69 ft from a nonpumping water level of 107 ft.

The pumping equipment presently installed consists of a 7 1/2-hp 3450 rpm Franklin electric motor (Model No. 3P1027B9D1), a Red Jacket submersible pump (Model No.

18E6) set at 240 ft, rated at 60 gpm, and has 240 ft of 2-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B40783) is for a water sample from the well collected April 13, 1976, after 30 min of pumping at 64 gpm.

#### WELL NO. 3, LABORATORY NO. B40783

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.0		Silica	SiO <sub>2</sub>	10	
Manganese	Mn	0.01		Fluoride	F	0.4	0.02
Ammonium	NH <sub>4</sub>	0.01	0.00	Boron	B	0.3	
Sodium	Na	30	1.30	Cyanide	CN	0.00	
Potassium	K	2.8	0.07	Nitrate	NO <sub>3</sub>	3.9	0.06
Calcium	Ca	78	3.79	Chloride	Cl	13	0.37
Magnesium	Mg	48	3.95	Sulfate	SO <sub>4</sub>	100	2.08
				Alkalinity (as CaCO <sub>3</sub> )		330	6.60
Arsenic	As	0.00		Hardness (as CaCO <sub>3</sub> )		387	7.74
Barium	Ba	0.1					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		475	
Copper	Cu	0.02					
Lead	Pb	0.00		pH (as rec'd)		7.5	
Mercury	Hg	0.0005		Radioactivity			
Nickel	Ni	0.0		Alpha pc/l		4.0	
Selenium	Se	0.00		± deviation		2.1	
Silver	Ag	0.00		Beta pc/l		3.9	
Zinc	Zn	0.0		± deviation		1.8	

## CREST HILL

The city of Crest Hill (7460) installed a public water supply in 1963. Four wells (Nos. 1, 3, 4, and 6) are in use. This supply is also cross connected with the city of Joliet. In 1966 there were 165 services, all metered. In 1980 there were 2509 services, all metered; the average pumpage was 1,000,984 gpd. The water is chlorinated and fluoridated; in addition, the water from Well Nos. 1 and 4 is treated with polyphosphate.

WELL NO. 1 (East Well), open to the Silurian dolomite, was completed in August 1963 to a depth of 303 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at the elevated tank at Oakland and Chaney Sts., approximately 2400 ft S and 1050 ft E of the NW corner of Section 33, T36N, R10E. The land surface elevation at the well is approximately 620 ft.

A driller's log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	35	35
Limestone	265	300
Shale	3	303

A 12-in. diameter hole was drilled to a depth of 59 ft and finished 8 in. in diameter from 59 to 303 ft. The well is cased with 12-in. drive pipe from about 1.2 ft above the

pump station floor to a depth of 35 ft and 8-in. pipe from about 1.2 ft above the pump station floor to a depth of 59 ft (cemented in).

Upon completion, the well was pumped for 9.5 hr and reportedly produced 300 gpm with a drawdown of 17 ft and 535 gpm with a drawdown of 65 ft from a nonpumping water level of 40 ft below the top of the casing.

The pumping equipment presently installed consists of a 25-hp 1760 rpm General Electric motor, an 8-in., 10-stage Peerless turbine pump set at 250 ft, rated at 225 gpm at about 250 ft TDH, and has 250 ft of 5-in. column pipe. The well is equipped with 250 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C002334) of a sample collected December 20, 1977, showed the water to have a hardness of 394 mg/l, total dissolved minerals of 526 mg/l, and an iron content of 0.2 mg/l.

WELL NO. 2 (formerly Lidice Subdivision Well No. 3), open to the Cambrian-Ordovician aquifer, was completed in September 1945 to a depth of 1652 ft by the J. P. Miller Artesian Well Co., Brookfield. This well is not in use. The well is located at the northwest corner of Theodore St. and Raynor Ave., approximately 120 ft N and 55 ft W of the

SE corner of Section 32, T36N, R10E. The land surface elevation at the well is approximately 656 ft.

A sample study and drillers log of Well No. 2 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
"Glacial drift"	69	69
"Gravel"	8	75
"Shale, thin bed of limestone"	37	112
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
"Limestone"	168	280
Dolomite, shaly	15	295
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone		
"Limestone"	41	336
Scales Shale		
Shale	50	386
Galena and Platteville Groups		
Dolomite, some limestone	367	753
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, incoherent	129	882
Shale, some dolomitic, sandstone chert	48	930
Prairie du Chien Group		
Shakopee Dolomite		
Dolomite, thin bed of sandstone	20	950
Oneota Dolomite		
Dolomite, some sandstone, thin beds of shale	221	1171
<b>CAMBRIAN SYSTEM</b>		
Eminence-Potosi Dolomite	164	1335
Franconia Formation		
Dolomite, sandstone, shale	124	1459
Ironton-Galesville Sandstone		
Sandstone, partly dolomitic	66	1525
Sandstone, incoherent	65	1590
Sandstone, partly dolomitic	45	1635
Eau Claire Formation		
Dolomite and shale	17	1652

An 18-in. diameter hole was drilled to a depth of 432 ft, reduced to 10 in. between 432 and 975 ft, and finished 8 in. in diameter from 975 to 1652 ft. The well is cased with 18-in. OD pipe from about 0.2 ft above the pumphouse floor to a depth of 112 ft, 10-in. ID pipe from about 0.2 ft above the pumphouse floor to a depth of 432 ft (cemented in), and an 8-in. ID liner from 810 ft to a depth of 975 ft.

After the well was shot with 150 lb of nitrogel at 1585 ft, a production test was conducted on October 19-20, 1945, by representatives of the driller and the State Water Survey. After 13 hr of intermittent pumping at rates ranging from 82 to 110 gpm, the drawdown was 20 ft from a nonpumping water level of 440 ft below the pump base.

The pumping equipment presently installed consists of a 100-hp U. S. electric motor, a 41-stage Peerless turbine pump set at 850 ft, rated at 250 gpm, and has 850 ft of 6-in. column pipe. A 10-ft section of 6-in. suction pipe is attached to the pump intake. The well is equipped with 850 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. A16672) is for a water sample from the well collected March 23, 1976, after 24 hr of pumping at 200 gpm.

WELL NO. 2, LABORATORY NO. A16672									
		mg/l	me/l			mg/l	me/l		
Iron	Fe	0.2		Silica	SiO <sub>2</sub>	8			
Manganese	Mn	0.02		Fluoride	F	1.8	0.10		
Ammonium	NH <sub>4</sub>	1.16	0.06	Boron	B	1.0			
Sodium	Na	60	2.61	Cyanide	CN	0.00			
Potassium	K	14	0.36	Nitrate	NO <sub>3</sub>	0.0	0.00		
Calcium	Ca	55	2.74	Chloride	Cl	25	0.70		
Magnesium	Mg	17	1.40	Sulfate	SO <sub>4</sub>	60	1.25		
				Alkalinity (as CaCO <sub>3</sub> )		264	5.28		
Arsenic	As	0.002		Hardness (as CaCO <sub>3</sub> )		207	4.14		
Barium	Ba	0.0							
Cadmium	Cd	0.00		Total dissolved minerals		390			
Chromium	Cr	0.03							
Copper	Cu	0.00		pH (as rec'd)		7.6			
Lead	Pb	0.00		Radioactivity					
Mercury	Hg	0.0003		Alpha pc/l		34.3			
Nickel	Ni	0.0		± deviation		5.2			
Selenium	Se	0.00		Beta pc/l		35.5			
Silver	Ag	0.00		± deviation		3.4			
Zinc	Zn	0.0							

WELL NO. 3 (West Well, formerly known as Well No. 2), open to the Silurian dolomite, was completed in August 1963 to a depth of 310 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located on Root St. near Leness Lane, approximately 950 ft S and 3700 ft E of the NW corner of Section 31, T36N, R10E. The land surface elevation at the well is approximately 633 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	73	73
Limestone	229	302
Shale	8	310

A 12-in. diameter hole was drilled to a depth of 73 ft and finished 8 in. in diameter from 73 to 310 ft. The well is cased with 12-in. drive pipe from about 0.8 ft above the pumphouse floor to a depth of 73 ft and 8-in. pipe from about 0.8 ft above the pumphouse floor to a depth of 74 ft (cemented in).

Upon completion, the well reportedly produced from 200 to 250 gpm for 8.5 hr with drawdowns ranging from 48 to 60 ft from a nonpumping water level of 55 ft below the top of the casing.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 300643) set at 250 ft, rated at 180 gpm, and powered by a 20-hp 1800 rpm U. S. electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B46303) is for a water sample from the well collected April 21, 1980, after 24 hr of pumping at 160 gpm.

WELL NO. 3, LABORATORY NO. B46303

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.39		Silica	SiO <sub>2</sub>	14	
Manganese	Mn	<0.005		Fluoride	F	0.50	0.03
Ammonium	NH <sub>4</sub>	0.9	0.06	Boron	B	0.29	
Sodium	Na	27	1.17	Cyanide	CN	0.01	
Potassium	K	4.7	0.12	Nitrate	NO <sub>3</sub>	<0.4	
Calcium	Ca	88	4.39	Chloride	Cl	20	0.56
Magnesium	Mg	41	3.37	Sulfate	SO <sub>4</sub>	78	1.62
Strontium	Sr	0.84		Alkalinity(asCaCO <sub>3</sub> )		348	6.96
Arsenic	As	0.003		Hardness(asCaCO <sub>3</sub> )		389	7.78
Barium	Ba	0.12					
Beryllium	Be	<0.0005		Total dissolved			
Cadmium	Cd	<0.0005		minerals		496	
Chromium	Cr	<0.005					
Cobalt	Co	<0.005					
Copper	Cu	<0.005					
Lead	Pb	<0.005					
Lithium	Li	0.09					
Mercury	Hg	<0.00005					
Nickel	Ni	<0.005					
Selenium	Se	<0.0005					
Silver	Ag	<0.01					
Vanadium	V	<0.005					
Zinc	Zn	<0.005		pH (as rec'd)		7.8	

WELL NO. 4 (formerly Richland Subdivision Well No. 3), open to the Silurian dolomite and the Maquoketa Group, was completed in March 1951 to a depth of 300 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at the corner of Park Rose and Webb Sts., approximately 1485 ft S and 833 ft E of the NW corner of Section 31, T36N, R10E. The land surface elevation at the well is approximately 622 ft.

A drillers log of Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Surface	5	5
Yellow clay	15	20
Blue clay	15	35
Lime	20	55
Hard gray lime	25	80
Shale and blue clay	10	90
Lime shells, shale	20	110
Gray lime	10	120
Pink rock	10	130
Blue lime	10	140
Gray lime	25	165
Blue lime gray	20	185
Hard gray lime	20	205
No record	10	215
Sandy lime shells	25	240
No record	10	250
Sandy gray lime	5	255
Sandy brown lime	5	260
Brown sandy lime	5	265
Lime and shale	35	300

A 12-in. diameter hole was drilled to a depth of 55 ft, reduced to 10 in. between 55 and 165 ft, and finished 8 in. in diameter from 165 to 300 ft. The well is cased with 10-in.

pipe from about 1.5 ft above the pumphouse floor to a depth of 55 ft and 8-in. pipe from land surface to a depth of 165 ft.

Upon completion, the well reportedly produced 210 gpm for 1.2 hr with a drawdown of 15 ft from a nonpumping water level of 30 ft below the top of the casing.

The pumping equipment presently installed consists of a 30-hp U. S. electric motor, an 11-stage Peerless turbine pump set at 160 ft, rated at 370 gpm, and has 160 ft of 5-in. column pipe. A 10-ft section of 5-in. suction pipe is attached to the pump intake. The well is equipped with 160 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C003011) is for a water sample from the well collected March 8, 1978, after 1 hr of pumping at 335 gpm.

WELL NO. 4, LABORATORY NO. C003011

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.1		Silica	SiO <sub>2</sub>	8	
Manganese	Mn	0.03		Fluoride	F	0.4	0.02
Ammonium	NH <sub>4</sub>	0.55	0.03	Boron	B	0.4	
Sodium	Na	26	1.13	Cyanide	CN	0.00	
Potassium	K	2.2	0.06	Nitrate	NO <sub>3</sub>	0.00	0.00
Calcium	Ca	104	5.19	Chloride	Cl	55	1.55
Magnesium	Mg	44	3.62	Sulfate	SO <sub>4</sub>	120	2.50
				Alkalinity(asCaCO <sub>3</sub> )		320	6.40
Arsenic	As	0.000		Hardness(asCaCO <sub>3</sub> )		442	8.84
Barium	Ba	0.3					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		606	
Copper	Cu	0.00					
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.04		pH (as rec'd)		7.3	

WELL NO. 5 (Hillcrest Well, formerly called Well No. 3), open to the Silurian dolomite, was completed in August 1959 to a depth of 282 ft by the J. P. Miller Artesian Well Co., Brookfield. This well is not in use. The well is located in the Hillcrest Shopping Center about 50 ft northwest of the elevated tank, approximately 1215 ft N and 2004 ft W of the SE corner of Section 31, T36N, R10E. The land surface elevation at the well is approximately 590 ft.

A drillers log of Well No. 5 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	5	5
Limestone	263	268
Shale	14	282

A 15-in. diameter hole was drilled to a depth of 43 ft, reduced to 12 in. between 43 and 212 ft, and finished 10 in. in diameter from 212 to 282 ft. The well is cased with 12-in. pipe from land surface to a depth of 43 ft (cemented in) and a 10-in. perforated liner from 80 ft to a depth of 212 ft.

On September 6, 1959, the well reportedly produced 200 gpm for 5 hr with a drawdown of 62 ft from a non-pumping water level of 5 ft.

The pumping equipment presently installed is a Peerless submersible pump set at 105 ft, rated at 200 gpm at about 201 ft head, and powered by a 15-hp U. S. electric motor.

WELL NO. 3, open to the Silurian dolomite and the Maquoketa Group, was completed in August 1947 to a depth of 352 ft (reported to be 315 ft deep in 1979) by the J. P. Miller Artesian Well Co., Brookfield. This well was acquired from the Coca Cola Bottling Co. in 1978. The well is located on Route 30, approximately 200 ft N and 125 ft W of the SE corner of Section 31, T36N, R10E. The land surface elevation at the well is approximately 623 ft.

A drillers log of Well No. 6 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	18	18
Sand and gravel	28	46
Limestone	70	116
Shale	28	144
Limestone	17	161
Shale	4	165
Limestone	148	313
Shale	10	323
Limestone	37	360

Originally, a 10-in. diameter hole was drilled to a depth of 352 ft. In 1979, it was reported that the hole was 10 in. in diameter to a depth of 102.3 ft and 8 in. in diameter from 102.3 to 315 ft. The well is cased with 10-in. pipe from land surface to a depth of 40 ft.

A production test was conducted by the driller on August 6, 1947. After 5.9 hr of pumping at rates ranging from 230 to 110 gpm, the final drawdown was 82 ft from a nonpumping water level of 46 ft below the top of the casing.

On January 6, 1961, the nonpumping water level was reported to be 40 ft below the pump base.

A production test was conducted by the driller on April 24, 1979. After 3.2 hr of pumping at rates ranging

from 195 to 240 gpm, the drawdown was 49 ft from a non-pumping water level of 58 ft. Pumping was continued for 1.4 hr at a rate of 190 gpm with a drawdown of 40 ft. After an additional 1.9 hr of pumping at a rate of 150 gpm, the final drawdown was 31 ft. Twenty min after pumping was stopped, the water level had recovered to 60 ft.

The pumping equipment presently installed is a submersible pump rated at 210 gpm, and powered by a 25-hp electric motor.

A partial analysis of a sample (Lab. No. 153955) collected January 6, 1961, after pumping for 5 min at 100± gpm, showed the water to have a hardness of 388 mg/l, total dissolved minerals of 442 mg/l, and an iron content of 0.1 mg/l.

WELL NO. 7, open to the Silurian dolomite, was completed in October 1979 to a depth of 296 ft by the J. P. Miller Artesian Well Co., Brookfield. As of October 1980, this well was not in use. The well is located approximately 2400 ft N and 350 ft W of the SE corner of Section 32, T36N, R10E. The land surface elevation at the well is approximately 610 ft.

A drillers log of Well No. 7 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	26	26
Limestone	268	294
Shale	8	302

A 15-in. diameter hole was drilled to a depth of 40 ft and finished 12 in. in diameter from 40 to 296 ft. The well is cased with 16-in. OD steel pipe from land surface to a depth of 26 ft and 12-in. steel pipe from land surface to a depth of 40 ft (cemented in).

Upon completion, the well reportedly produced 440 gpm for 8 hr with a drawdown of 86 ft from a nonpumping water level of 47 ft below land surface.

The permanent pumping equipment is not yet installed.

## CRETE

The village of Crete (4656) installed a public water supply in 1903. Three wells (Nos. 3, 4, and 5) are in use. In 1949 there were 350 services, 98 percent metered; the estimated average pumpage was 75,000 gpd. In 1980 there were 1415 services, all metered; the average pumpage was 439,408 gpd. The water is chlorinated and fluoridated.

WELL NO. 1, open to the Silurian dolomite, was completed in 1903 to a depth of 192 ft. This well was abandoned in 1979. The well is located in the west end of the village hall building at 524 Exchange St., approximately 730 ft N

and 180 ft W of the SE corner of Section 8, T34N, R14E. The land surface elevation at the well is approximately 725 ft.

A 10-in. diameter hole was drilled to a depth of 192 ft. The well is cased with 10-in. pipe from land surface to a depth of 150 ft.

On June 29, 1915, the nonpumping water level was reported to be 30 ft below the pump base.

A production test was conducted on December 5, 1945, by representatives of the State Water Survey and Miller Engineering Co. After 1.2 hr of pumping at a rate of 123

## INGALL'S PARK SUBDIVISION

Ingall's Park Subdivision (est. 805), located on the east edge of Joliet, installed a public water supply in 1930. The water system is owned and operated by the Ingall's Park Water Association. Two wells are in use. In 1961 there were 174 services; the average and maximum pumpages were 20,000 and 30,000 gpd, respectively. In 1980 there were 245 services, all metered; the average pumpage was 54,000 gpd. The water is chlorinated and fluoridated.

WELL NO. 1, open to the Silurian dolomite, the Maquoketa Group, and the Galena-Platteville dolomite, was completed in 1930 to a depth of 700 ft by the Heflin Well Drillers, Joliet. The well is located at the northwest corner of Peale St. and Fourth Ave., approximately 2550 ft S and 600 ft E of the NW corner of Section 13, T35N, R10E. The land surface elevation at the well is approximately 640 ft.

The well is cased with 6-in. pipe from about 0.2 ft above the wellhouse floor to a depth of 200 ft.

Nonpumping water levels were reported to be 30 ft on May 1, 1942, and 86 ft on May 27, 1970.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B41300) is for a water sample from the well collected April 6, 1978, after 30 min of pumping at 120 gpm.

WELL NO. 1, LABORATORY NO. B41300

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.1		Silica	SiO <sub>2</sub>	12	
Manganese	Mn	0.01		Fluoride	F	0.3	0.02
Ammonium	NH <sub>4</sub>	0.1	0.01	Boron	B	0.1	
Sodium	Na	36	1.57	Cyanide	CN	0.00	
Potassium	K	2.4	0.06	Nitrate	NO <sub>3</sub>	7.5	0.12
Calcium	Ca	120	5.99	Chloride	Cl	110	3.10
Magnesium	Mg	62	5.10	Sulfate	SO <sub>4</sub>	132	2.75
				Alkalinity(asCaCO <sub>3</sub> )		343	6.86
Arsenic	As	0.00		Hardness(asCaCO <sub>3</sub> )		564	11.28
Barium	Ba	0.1					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		742	
Copper	Cu	0.01					
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.3	

The pumping equipment presently installed is a submersible pump set at 221 ft, rated at 60 gpm, and powered by an electric motor.

WELL NO. 2, open to the Silurian dolomite, was completed in 1976 to a depth of 305 ft by the Lockport Well & Pump Co., Joliet. The well is located about 50 ft west of Well No. 1, approximately 2550 ft S and 550 ft E of the NW corner of Section 13, T35N, R10E. The land surface elevation at the well is approximately 640 ft.

Information on the hole and casing records are not available.

The pumping equipment presently installed is a 12-stage Red Jacket submersible pump set at 250 ft, rated at 100 gpm, and powered by an electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B18240) is for a water sample from the well collected October 27, 1976, after 30 min of pumping at 120 gpm.

WELL NO. 2, LABORATORY NO. B18240

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.0		Silica	SiO <sub>2</sub>	11.7	
Manganese	Mn	0.06		Fluoride	F	0.1	0.00
Ammonium	NH <sub>4</sub>	0.2	0.01	Boron	B	0.2	
Sodium	Na	21	0.91	Cyanide	CN	0.00	
Potassium	K	2.9	0.07	Nitrate	NO <sub>3</sub>	0.4	0.01
Calcium	Ca	121	6.04	Chloride	Cl	69	1.95
Magnesium	Mg	59	4.86	Sulfate	SO <sub>4</sub>	120	2.50
				Alkalinity(asCaCO <sub>3</sub> )		356	7.12
Arsenic	As	0.00		Hardness(asCaCO <sub>3</sub> )		546	10.92
Barium	Ba	0.1					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		646	
Copper	Cu	0.01					
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.1		pH (as rec'd)		7.3	

## JOLIET

The city of Joliet (80,378) installed a public water supply in 1884. Water was supplied by a private company until 1888 when the city purchased the company. Fourteen wells (Washington St. No. 1, Ottawa St., Spruce Slip, Jasper St., Williamson Ave., Campbell St., Essington Road, Gravel Wells 1-5, and Rock Wells 1 and 2) are in use. Water from this

supply is also furnished to the Lockport Township Water System and to the village of Rockdale. The supplies of Crest Hill and Preston Utility Co. are cross connected to Joliet. In 1951 the average and maximum pumpages were 5,620,000 and 6,430,000 gpd, respectively. In 1980 there were 20,973 services, all metered; the average pumpage was 13,550,780

gpd. The water is chlorinated; water from Gravel Wells 1-5 and Rock Wells 1 and 2 is also filtered.

Initially, water was obtained from twenty 6-in. diameter wells finished in sand and gravel to depths of about 40 ft. These wells were abandoned prior to 1960. The wells were located in the valley of Hickory Creek north of Washington St., west of the Elgin, Joliet & Eastern RR in the eastern part of the city in the northwest quarter of Section 14, T35N, R10E. These wells supplied the city until a supplementary supply consisting of the first six deep sandstone wells were drilled.

At times water was taken from Hickory Creek and from a stone quarry nearby to supplement the city supply. These sources of supply were abandoned after about 1930.

*A description of the sandstone wells at the Washington St. Pumping Station follows:*

OLD WELL NO. 1, open to the Cambrian-Ordovician aquifer, was completed prior to 1900 to a depth of 1785 ft. This well was abandoned in 1937 and sealed between 1948 and 1960. The well was located north of Washington St. west of the Elgin, Joliet & Eastern RR, approximately 445 ft S and 1350 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 565 ft.

A 12-in. diameter hole was drilled to a depth of 553 ft and finished at an unknown diameter below 553 ft. The well was cased with 8-in. pipe from about 3 ft above the bottom of a pit floor to a depth of 400 ft.

In 1896 and 1899, the well reportedly flowed. Nonpumping water levels were reported to be 40 ft in 1900 and 209 ft in 1923.

A mineral analysis of a sample (Lab. No. 68211) collected December 17, 1930, showed the water to have a hardness of 311 mg/l, total dissolved minerals of 624 mg/l, and an iron content of 0 mg/l.

OLD WELL NO. 2, open to the Cambrian-Ordovician aquifer, was completed prior to 1900 to a depth of 1600 ft. This well was abandoned in 1937 and sealed between 1948 and 1960. The well was located about 20 ft north of Well No. 1, approximately 425 ft S and 1345 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 565 ft.

The well was cased with 6-in. pipe from about 3 ft above the bottom of a pit floor to a depth of 400 ft.

In 1896 and 1899, the well reportedly flowed. In 1900, the nonpumping water level was reported to be 40 ft.

OLD WELL NO. 3, open to the Cambrian-Ordovician aquifer, was completed prior to 1900 to a depth of 1600 ft. This well was abandoned in 1937 and sealed between 1948 and 1960. The well was located about 130 ft north of Well No. 1, approximately 315 ft S and 1350 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 565 ft.

The well was cased with 4-in. pipe to a depth of 400 ft. In 1896 and 1899, the well reportedly flowed. In 1900, the nonpumping water level was reported to be 40 ft.

OLD WELL NO. 4, open to the Cambrian-Ordovician aquifer, was completed prior to 1900 to a depth of 1686 ft (measured in 1929 at 1409 ft deep). This well was abandoned about 1933 and sealed prior to 1960. The well was located about 210 ft north of Well No. 1, approximately 235 ft S and 1350 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 565 ft.

The well was cased with 8-in. pipe from land surface to a depth of 400 ft.

In 1896 and 1899, the well reportedly flowed. Nonpumping water levels were reported to be 40 ft in 1900, 209 ft in 1923, 248.7 ft in October 1929, 229.2 ft in October 1933, and 324 ft in 1942.

OLD WELL NO. 5 (also known as Washington St. Well No. 2), open to the Cambrian-Ordovician aquifer, was completed prior to 1900 to a depth of 1704 ft (cleaned out in 1934 to 1665 ft and in 1937 to 1611 ft). This well was abandoned about 1948 and sealed in 1952. The well was located about 367 ft north of Washington St. and 250 ft west of the Elgin, Joliet & Eastern RR, approximately 160 ft S and 1500 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 565 ft.

A 12-in. diameter hole was drilled to a depth of 450 ft, reduced to 10 in. between 450 and 610 ft, reduced to 8 in. between 610 and 1300 ft, and finished 6 in. in diameter from 1300 to 1704 ft. The well was cased with 8-in. pipe to a depth of 400 ft.

In 1896 and 1899, the well reportedly flowed. Nonpumping water levels were reported to be 40 ft in 1900 and 209 ft in 1923.

In December 1929, the well reportedly produced 800 gpm with a drawdown of 141 ft from a nonpumping water level of 240 ft.

In October 1933, the nonpumping water level was reported to be 223.2 ft below the top of the well.

In 1934, J. O. Heflin, Joliet, shot this well with 52 qt of nitroglycerin at a depth of 1600 ft. The well was cleaned out and was reported to be 1665 ft deep.

In 1937, this well was shot with 50 lb of dynamite at 1540 ft and cleaned out by C. W. Varner, Dubuque, Iowa. After shooting, the well reportedly produced 450 gpm for 14 hr with a drawdown of 114 ft from a nonpumping water level of 242 ft below the top of the casing.

In 1940 and 1941, the nonpumping water level was reported to be 238 ft.

A mineral analysis of a sample (Lab. No. 79943) collected April 22, 1937, showed the water to have a hardness of 288 mg/l, total dissolved minerals of 535 mg/l, and an iron content of 0.4 mg/l.

OLD WELL NO. 6, open to the Cambrian-Ordovician aquifer, was completed prior to 1900 to a depth of 1419 ft. This well was abandoned in 1937 and sealed between 1948 and 1960. The well was located about 450 ft east of Well No. 4, approximately 240 ft S and 1800 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 565 ft.

A 12-in. diameter hole was drilled to a depth of 455 ft and finished at an unknown diameter below 455 ft. The well was cased with 6-in. pipe to a depth of 400 ft.

In 1896 and 1899, the well reportedly flowed.

Nonpumping water levels were reported to be 40 ft in 1900 and 209 ft in 1923.

A mineral analysis of a sample (Lab. No. 68216) collected December 17, 1930, showed the water to have a hardness of 344 mg/l, total dissolved minerals of 624 mg/l, and an iron content of 0 mg/l.

WASHINGTON ST. WELL NO. 1 (also known as Well 5D), open to the Cambrian-Ordovician aquifer, was completed in 1937 to a depth of 1608 ft (measured on April 10, 1946 at 1677 ft deep and cleaned out in 1956 to 1609 ft) by C. W. Varner, Dubuque, Iowa. The well is located at the southeast corner of the Washington St. Station at 921 East Washington St., approximately 480 ft S and 1460 ft E of the NW corner of Section 14, T35N, R10E. The land surface elevation at the well is approximately 564 ft.

A sample study log of the Washington St. Well No. 1 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
QUATERNARY SYSTEM		
Pleistocene Series		
Glacial drift	37	37
SILURIAN SYSTEM		
Niagaran and Alexandrian Series		
Dolomites, water bearing	183	220
ORDOVICIAN SYSTEM		
Maquoketa Group		
Ft. Atkinson Limestone		
Limestone	36	256
Scales Shale		
Shale	74	330
Galena and Platteville Groups		
Dolomite	345	675
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	254	929
Shale and lime, caving	53	982
ORDOVICIAN AND CAMBRIAN SYSTEMS		
Oneota, Eminence, Potosi, and Franconia Formations		
Dolomite and sandstone	449	1431
CAMBRIAN SYSTEM		
Iron-ton-Galesville Sandstone		
Sandstone, water bearing	116	1547
Eau Claire Formation		
Shale and dolomite	61	1608

A 23-in. diameter hole was drilled to a depth of 350 ft, reduced to 15 in. between 350 and 980 ft, reduced to 12 in.

between 980 and 1134 ft, and finished 10 in. in diameter from 1134 to 1608 ft. Originally, the well was cased with 24-in. drive pipe from land surface to a depth of 39 ft, 18-in. OD pipe from land surface to a depth of 68.5 ft, 18-in. OD pipe from 239 ft to a depth of 350 ft, 12-in. pipe from 917.5 ft to a depth of 980 ft, and 10-in. pipe from 1076.4 ft to a depth of 1134 ft. In November 1956, the 18-in. casing was removed, the hole was reamed out to 16 in. in diameter from 350 to 380 ft, and a new 16-in. OD casing was installed from land surface to a depth of 358 ft (cemented in). In 1971, the 12- and 10-in. diameter liners were removed and the hole was reamed out to 15.2 in. in diameter from 380 to 1134 ft and 12 in. in diameter from 1134 to 1609 ft. The well was then cased with a 12-in. liner from 915.2 ft to a depth of 1134 ft.

In July 1937, the well reportedly produced 1050 gpm with a drawdown of 125 ft from a nonpumping water level of 270 ft below the top of the casing.

In 1944, when the production dropped off, the pump was pulled and the hole was found bridged at 1192 ft and filled with sand to 1484 ft. The sand was bailed out to 1595 ft, a complete string of tools left in the hole in previous years was removed, and the hole cleaned to its original depth by October 30, 1944.

On October 4, 1946, the nonpumping water level was reported to be 409 ft below the pump base after a 45-min idle period.

From November 1956 through January 1957, the J. P. Miller Artesian Well Co., Brookfield, removed the 18-in. casing and reamed the hole out from 350 to 380 ft. A new liner was installed and a fill of 90 ft of material was cleaned out of the well to a depth of 1609 ft. The well was then shot with 114 lb of nitrogel and 4 lb of 60 percent dynamite between 1544 and 1550 ft. A second shot of 185 lb of 100 percent nitrogel and 10 lb of 60 percent dynamite was exploded between 1527 and 1540 ft. The well was cleaned out to 1609 ft and the nonpumping water level was reported to be 402 ft.

A production test was conducted by the J. P. Miller Artesian Well Co. on February 21, 1957. After 3 hr of pumping at a rate of 1000 gpm, the drawdown was 70 ft from a nonpumping water level of 420 ft.

In March 1962 the pump was pulled and the well was cleaned out.

In 1971, this well was rehabilitated by the J. P. Miller Artesian Well Co. The 12- and 10-in. diameter liners were removed, the hole reamed out, and a new liner installed.

The pumping equipment presently installed consists of a 200-hp 1775 rpm General Electric motor (Model No. 12F5159, Serial No. 6328607), a 12-in., 9-stage Peerless turbine pump (No. 8004) set at 800 ft, rated at 1200 gpm, and has 800 ft of 10-in. column pipe. A 20-ft section of 8-in. suction pipe is attached to the pump intake. The well is equipped with 800 ft of airline.



The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B052856) is for a water sample from the well collected April 29, 1981, after 24 hr of pumping at 796 gpm.

WASHINGTON ST. WELL NO. 1, LABORATORY NO. B052856

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.28		Silica	SiO <sub>2</sub>	7.7	
Manganese	Mn	0.006		Fluoride	F	1.33	0.07
Ammonium	NH <sub>4</sub>	0.6	0.03	Boron	B	0.59	
Sodium	Na	63	2.74	Cyanide	CN	<0.005	
Potassium	K	10.8	0.28	Nitrate	NO <sub>3</sub>	<0.4	
Calcium	Ca	75	3.74	Chloride	Cl	34	0.96
Magnesium	Mg	22.5	1.85	Sulfate	SO <sub>4</sub>	114	2.37
Strontium	Sr	2.66		Alkalinity(asCaCO <sub>3</sub> )		278	5.56
Arsenic	As	<0.001		Hardness(asCaCO <sub>3</sub> )		281	5.62
Barium	Ba	0.034					
Beryllium	Be	<0.0005		Total dissolved			
Cadmium	Cd	<0.003		minerals		515	
Chromium	Cr	<0.005					
Cobalt	Co	<0.005					
Copper	Cu	<0.003					
Lead	Pb	0.007					
Mercury	Hg	<0.00005					
Nickel	Ni	0.005					
Selenium	Se	<0.0005					
Silver	Ag	<0.005					
Vanadium	V	<0.004					
Zinc	Zn	0.054		pH (as rec'd)		7.4	

Other wells located throughout the city are listed as follows:

OTTAWA ST. WELL (also known as Well 1D), presently open to the Cambrian-Ordovician aquifer, was completed in September 1907 to a depth of 1621 ft (reported to be 1525 ft in 1944) by L. Wilson & Co., Chicago. The well is located at the southwest corner of Ottawa St. and Crowley Ave., approximately 2425 ft N and 425 ft W of the SE corner of Section 9, T35N, R10E. The land surface elevation at the well is approximately 533 ft.

A sample study log of the Ottawa St. Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
QUATERNARY SYSTEM		
Pleistocene Series		
Drift	5	5
SILURIAN SYSTEM		
Niagaran and Alexandrian Series		
Dolomite, water bearing	213	218
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale	140	358
Galena and Platteville Groups		
Dolomite	360	718
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	410	1128
Kress Member		
Shale and marl	59	1187
CAMBRIAN SYSTEM		
Potosi, Franconia, Ironton, and Galesville Formations		
Dolomites and sandstones	409	1596
Eau Claire Formation		
Shale	25	1621

Originally, a 19-in. diameter hole was drilled to a depth of 198 ft, reduced to 10 in. between 198 and 1195 ft, reduced to 8 in. between 1195 and 1288 ft, and finished 7 in. in diameter from 1288 to 1621 ft. The well was cased with 16-in. OD pipe from land surface to a depth of 198 ft, 8-in. liner from 1102 ft to a depth of 1195 ft, and 7-in. liner from 1195 ft to a depth of 1288 ft. In 1937, a 5-in. diameter perforated liner was placed from 1521 ft to a depth of 1621 ft. After rehabilitation in 1944, the well was reported to be 20 in. in diameter from land surface to 200 ft, 15.2 in. between 200 and 615 ft, 12 in. between 615 and 1209 ft, and 10 in. between 1209 and 1525 ft. The casing consisted of 16-in. OD pipe from about 0.2 ft above the pump station floor to a depth of 200 ft and a 10-in. ID liner from 1088 ft to a depth of 1209 ft. The top of the 5-in. perforated liner was in bad condition at a depth of 1525 ft but was not removed. In 1953, the 16-in. casing was removed and a new 12-in. pipe was installed from about 0.2 ft above the pump station floor to a depth of 303 ft (cemented in).

When originally completed in 1907, the well was left open to the base of the Silurian dolomite, the Maquoketa Group, and the Cambrian-Ordovician aquifer. The non-pumping water level was reported to be 8 ft below land surface in September 1907.

In July 1913, after pumping at a rate of 700 gpm, the drawdown was 82 ft from a nonpumping water level of 58 ft.

In 1923, the nonpumping water level was reported to be 180 ft.

In 1932, this well was shot with nitroglycerin and cleaned by J. O. Heflin, Joliet. The nonpumping water level was reported to be 246 ft after shooting.

In October 1933, the nonpumping water level was reported to be 264 ft.

In 1937, C. W. Varner, Dubuque, Iowa, cleaned the well, did some further shooting, and placed 100 ft of 5-in. perforated pipe at the bottom of the well.

On April 21, 1937, after 4 hr of pumping at rates ranging from 650 to 840 gpm, the final drawdown was 87 ft from a nonpumping water level of 236 ft.

In December 1938, the well reportedly produced 800 gpm with a drawdown of 93 ft from a nonpumping water level of 236 ft.

In 1944, this well was rehabilitated and reamed out by the J. P. Miller Artesian Well Co., Brookfield.

On March 9, 1945, after pumping at rates of 1100 to 1000 gpm, the drawdown was 92 ft from a nonpumping water level of 338 ft below the pump base.

Nonpumping water levels were reported to be 381 ft below the pump base after a 45-min idle period on October 4, 1946, and 362 ft on June 6, 1953.

During rehabilitation work in October 1953, the Silurian dolomite and Maquoketa Group were sealed from the hole leaving the well open to the Cambrian-Ordovician aquifer.

On August 19, 1959, the nonpumping water level was reported to be 414 ft.

In March 1974, the well reportedly produced 1025 gpm for 22 hr with a drawdown of 55 ft from a nonpumping water level of 605 ft below land surface.

The pumping equipment presently installed consists of a 200-hp General Electric motor, a 12-in. Peerless turbine pump set at 710 ft, rated at 1000 gpm, and has 710 ft of 8-in. column pipe. A 10-ft section of 8-in. suction pipe is attached to the pump intake. The well is equipped with 710 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C003737) of a sample collected April 2, 1979, after pumping for 24 hr, showed the water to have a hardness of 263 mg/l, total dissolved minerals of 564 mg/l, and an iron content of 0.3 mg/l. Hydrogen sulfide was apparent when a previous sample was collected.

CANAL ST. WELL, open to the Cambrian-Ordovician aquifer except for the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in 1911 to a depth of 1575 ft by the Ohio Drilling Co., Massillon, Ohio. This well was abandoned in 1931 and sealed prior to 1948. The well was located at the corner of Canal and Division Sts. near the west bank of the Des Plaines River, approximately 2640 ft S and 1125 ft W of the NE corner of Section 9, T35N, R10E. The land surface elevation at the well is approximately 532 ft.

A sample study log of the Canal St. Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Glacial drift	3	3
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomites, water bearing	212	215
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone		
Dolomite	10	225
Scales Shale		
Shale, some dolomite	70	295
Galena and Platteville Groups		
Dolomite	325	620
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	200	820
Canadian Group		
Shakopee-Oneota Dolomite	225	1045
<b>CAMBRIAN SYSTEM</b>		
Eminence Dolomite		
Sandy dolomite	30	1075
Potosi Dolomite	165	1240
Franconia Formation		
Sandstone and dolomite	90	1330
Ironton-Galesville Sandstone		
Sandstone, water bearing	185	1515
Eau Claire Formation		
Sandstone and dolomite	55	1570

A 14-in. diameter hole was drilled to a depth of 318 ft, reduced to 11 in. between 318 and 893 ft, and finished 10.6 in. in diameter from 893 to 1575 ft. The well was cased with 14-in. pipe to a depth of 318 ft and 10.6-in. pipe from land surface to a depth of 893 ft (cemented in).

In 1922, the well reportedly produced 292 gpm with a drawdown of 129 ft from a nonpumping water level of 160 ft below the top of the well.

On October 5, 1933, the nonpumping water level was reported to be 187.2 ft below the pump station floor.

A mineral analysis of a sample (Lab. No. 68217) collected December 17, 1930, showed the water to have a hardness of 183 mg/l, total dissolved minerals of 550 mg/l, and an iron content of 0 mg/l.

SPRUCE SLIP WELL (also known as Well 2D), open to the Cambrian-Ordovician aquifer, was completed in 1912 to a depth of 1565 ft (cleaned out to 1535 ft in 1948 and to 1556 ft in 1958) by the Ohio Drilling Co., Massillon, Ohio. The well is located on Spruce Slip St. just east of South Chicago St., approximately 2100 ft S and 255 ft E of the NW corner of Section 15, T35N, R10E. The land surface elevation at the well is approximately 529 ft.

A sample study log of the Spruce Slip Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomites	200	200
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Dolomite and shale	80	280
Galena and Platteville Groups		
Dolomite	330	610
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	230	840
<b>ORDOVICIAN AND CAMBRIAN SYSTEMS</b>		
Oneota, Eminence, and Potosi Dolomites	395	1235
<b>CAMBRIAN SYSTEM</b>		
Franconia Formation		
Sandstone and dolomite	105	1340
Ironton-Galesville Sandstone		
Sandstone, water bearing	180	1520
Eau Claire Formation	10	1530

A 16-in. diameter hole was drilled from 35 ft to a depth of 320 ft, reduced to 13 in. between 320 and 882 ft, and finished 10 in. in diameter from 882 to 1565 ft. Originally, the well was cased with 14-in. pipe from about 1 ft above the wellhouse floor to a depth of 320 ft. In 1948, the casing was removed and an 18-in. OD surface pipe was placed from land surface to a depth of 35 ft, 14-in. pipe from land surface to a depth of 326 ft (cemented in), and a 10-in. liner from 717.5 ft to a depth of 882 ft.

Upon completion, the well reportedly produced 400 gpm with a drawdown of 106 ft from a nonpumping water level of 36 ft below land surface.

In 1922, after pumping at a rate of 184 gpm, the drawdown was 334.0 ft from a nonpumping water level of 142.6 ft.

From January to May 1948, the J. P. Miller Artesian Well Co., Brookfield, shot this well with 200 lb blasting gelatin but no sand was released. Further shooting consisted of 300 lb of gel at 1490 ft, 356 lb of gel at 1470 ft, and 400 lb of nitrogel between 1416 and 1438 ft. New casings and liner were installed.

A production test was conducted by the J. P. Miller Artesian Well Co. on May 25-26, 1948. After 28.5 hr of pumping at rates ranging from 250 to 500 gpm, the maximum drawdown was 180 ft from a nonpumping water level of 320 ft.

A production test was conducted by the J. P. Miller Artesian Well Co. on July 3, 1950. After 6.5 hr of pumping at rates of 805 to 791 gpm, the final drawdown was 210 ft from a nonpumping water level of 368 ft. Forty min after pumping was stopped, the water level had recovered to 386 ft.

Nonpumping water levels were reported to be 383 ft in June 1951 and 388 ft on January 20, 1958.

From January to April 1958, this well was rehabilitated. The well had filled in to 1470 ft, presumably from an earlier shooting. About 19 cubic yards of material was cleaned out to a depth of 1556 ft.

This well was rehabilitated and cleaned in July 1962 and 1973.

The pumping equipment presently installed consists of a 200-hp 1775 rpm General Electric motor (Model No. 12F5983, Serial No. WD6781582), a 15-stage Peerless turbine pump (Serial No. 50439) set at 960 ft, rated at 1000 gpm, and has 960 ft of 8-in. column pipe. The well is equipped with 960 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C003733) of a sample collected April 2, 1979, after pumping for 24 hr at 300 gpm, showed the water to have a hardness of 255 mg/l, total dissolved minerals of 594 mg/l, and an iron content of 0.1 mg/l.

VAN BUREN ST. WELL, open to the Cambrian-Ordovician aquifer, was completed in 1913 to a depth of 1547.5 ft by the Ohio Drilling Co., Massillon, Ohio. This well was abandoned in 1941 and sealed about 1955. The well was located on Van Buren St. west of Eastern Ave., approximately 780 ft N and 1400 ft E of the SW corner of Section 10, T35N, R10E. The land surface elevation at the well is approximately 538 ft.

A sample study log of the Van Buren St. Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
No record	330	330
<b>ORDOVICIAN SYSTEM</b>		
Galena and Platteville Groups		
Dolomite	290	620
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	300	920

Strata (continued)	Thickness (ft)	Depth (ft)
Prairie du Chien Group		
Oneota Dolomite	100	1020
Gunter Sandstone	30	1050
<b>CAMBRIAN SYSTEM</b>		
Eminence-Potosi Dolomite	170	1220
Franconia Formation		
Dolomite and sandstone	140	1360
Iron-ton-Galesville Sandstone	160	1520
Eau Claire Formation		
Sandstone and shale	30	1550

A 14-in. diameter hole was drilled to a depth of 328 ft, reduced to 10 in. between 328 and 965 ft, reduced to 9.6 in. between 965 and 1430 ft, and finished 7.6 in. in diameter from 1430 to 1547.5 ft. The well was cased with 14-in. pipe from 1 ft above land surface to a depth of 328 ft and 10-in. liner from 800 ft to a depth of 900 ft.

Upon completion, after pumping at a rate of 450 gpm, the drawdown was 177 ft from a nonpumping water level of 63 ft below land surface.

In 1922, the well reportedly produced 485 gpm with a drawdown of 229.5 ft from a nonpumping water level of 188.5 ft.

On October 5, 1933, the nonpumping water level was reported to be 223.5 ft below land surface.

A mineral analysis of a sample (Lab. No. 68213) collected December 17, 1930, showed the water to have a hardness of 233 mg/l, total dissolved minerals of 567 mg/l, and an iron content of 0 mg/l.

DES PLAINES ST. WELL, open to the Cambrian-Ordovician aquifer, was completed in 1913 to a depth of 1575 ft by the Ohio Drilling Co., Massillon, Ohio. This well is presently in use only as an observation well by the State Water Survey. The well is located west of Des Plaines St. near Lafayette St. and the east bank of the Des Plaines River, approximately 360 ft S and 1240 ft W of the NE corner of Section 16, T35N, R10E. The land surface elevation at the well is approximately 531 ft.

A sample study log of the Des Plaines St. Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>SILURIAN SYSTEM</b>		
Niagan and Alexandrian Series		
Dolomite and limestone	190	190
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone		
Dolomite	10	200
Scales Shale	80	280
Galena Group		
Dolomite	190	470
Platteville Group		
Dolomite and limestone	125	595
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, incoherent	485	1080
Shale and chert, caving	20	1100

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>CAMBRIAN SYSTEM</b>		
Potosi Dolomite	150	1250
Franconia Formation		
Sandy limestone and sandstone	150	1400
Ironton-Galesville Sandstone		
Sandstone, water bearing	160	1560

The well is reportedly cased with 14-in. pipe from 2.5 ft above land surface to a depth of 300 ft, 7-in. liner from 600 ft to a depth of 824 ft, and 5.9-in. liner from 1200 ft to a depth of 1300 ft.

Upon completion, after pumping at a rate of 450 gpm, the drawdown was 116 ft from a nonpumping water level of 64 ft below land surface.

In 1922, the well reportedly produced 305 gpm with a drawdown of 89 ft from a nonpumping water level of 189 ft.

Nonpumping water levels were reported to be 222 ft below land surface on October 4, 1933, and 219 ft below the top of the casing on July 21, 1941.

Monthly measurements of the nonpumping water level during the period July 1942 to March 1981 ranged from about 259 to 618 ft below land surface.

A mineral analysis of a sample (Lab. No. 68218) collected December 17, 1930, showed the water to have a hardness of 246 mg/l, total dissolved minerals of 532 mg/l, and an iron content of 0 mg/l.

**RUBY ST. WELL**, open to the Cambrian-Ordovician aquifer except for the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in 1915 to a depth of 1564 ft (reported to be 1565 ft in 1931, sounded in 1940 at 1544 ft, and rehabilitated in 1944-1945 to a depth of 1568 ft) by the Ohio Drilling Co., Massillon, Ohio. This well was abandoned in 1951 and sealed in 1956. The well was located just south of the Ruby St. bridge on the west bank of the Des Plaines River, approximately 565 ft S and 470 ft W of the NE corner of Section 9, T35N, R10E. The land surface elevation at the well is approximately 546 ft.

A sample study log of the Ruby St. Well furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomite, water bearing	180	180
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Scales Shale	80	260
Galena and Platteville Groups		
Dolomite	340	600
Ancell Group		
Glenwood-St. Peter Sandstone	390	990
Prairie du Chien Group		
Oneota Dolomite	20	1010
Gunter Sandstone	10	1020
<b>CAMBRIAN SYSTEM</b>		
Eminence-Potosi Dolomite	210	1230
Franconia Formation		
Dolomite and sandstone	120	1350

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Ironton-Galesville Sandstone		
Sandstone, water bearing	130	1480
Eau Claire Formation		
Dolomite and shale	80	1560

Originally, a 14-in. diameter hole was drilled to a depth of 303 ft, reduced to 12 in. between 303 and 1019 ft, and finished 10 in. in diameter from 1019 to 1564 ft. The well was cased with 14-in. pipe to a depth of 303 ft. In 1931, when the well was repaired, the hole was reported to be 17 in. in diameter from land surface to a depth of 303 ft, 13 in. between 303 and 1170 ft, and 10 in. between 1170 and 1565 ft. The well was cased with 12-in. pipe to a depth of 410 ft, 10-in. pipe from 410 ft to a depth of 1237.5 ft, and an 8-in. perforated pipe from 1237.5 ft to a depth of 1438 ft. After rehabilitation in 1944-1945, the hole was reported to be 18 in. in diameter from 0 to 440 ft, 12 in. from 440 to 1237 ft, and 10 in. from 1237 to 1568 ft. The well was then cased with 14-in. pipe from land surface to a depth of 440 ft, 12-in. standard pipe from land surface to a depth of 437 ft, 10-in. pipe from 437 ft to a depth of 1237 ft, and an 8-in. perforated pipe from 1237 ft to a depth of 1438 ft.

In 1922, the well reportedly produced 532 gpm with a drawdown of 188 ft from a nonpumping water level of 185 ft.

After repairing in 1931 by the S. B. Geiger & Co., Chicago, the depth was reported to be 1565 ft. The old casing was removed and new casings and a liner were installed.

On October 5, 1933, the nonpumping water level was reported to be 210 ft below land surface.

On January 4, 1940, the J. P. Miller Artesian Well Co., Brookfield, sounded this well and the depth was reported to be 1544 ft and the nonpumping water level was 228 ft below the pump base.

This well was rehabilitated in 1944-1945 by the J. P. Miller Artesian Well Co. The old casing was removed, the hole reamed out, and new casings installed.

On February 19, 1945, the well reportedly produced 680 gpm with the pumping level below the 458-ft airline from a nonpumping water level of 348 ft below the pump base.

On October 4, 1946, the well reportedly produced 600 gpm with the pumping level below the 458-ft airline. After pumping was stopped for 45 min, the water level had recovered to 398 ft below the pump base.

In September 1951, the nonpumping water level was reported to be 434 ft.

A mineral analysis of a sample (Lab. No. 108174) collected October 31, 1946, after pumping for 20 min at 600 gpm, showed the water to have a hardness of 263 mg/l, total dissolved minerals of 475 mg/l, and an iron content of 0.5 mg/l.

JASPER ST. WELL (also known as Well 3D), open to the Cambrian-Ordovician aquifer, was completed in 1924 to a depth of 1565 ft (reported to be 1558 ft in 1933 and cleaned out to 1536 ft in 1947) by William H. Cater, Chicago. The well is located at 325 Jasper St. just off Center St. near the west bank of the Des Plaines River, approximately 1850 ft N and 2630 ft E of the SW corner of Section 16, T35N, R10E. The land surface elevation at the well is approximately 537 ft.

A sample study log of the Jasper St. Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>SILURIAN SYSTEM</b>		
Niagaran Series		
Joliet Dolomite	50	50
Alexandrian Series		
Kankakee Dolomite	30	80
Elwood Dolomite	20	100
Wilhelmi Formation	70	170
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone	20	190
Scales Shale	80	270
Galena Group	200	470
Platteville Group	125	595
Ancell Group		
Glenwood Formation		
Dolomite and sandstone	20	615
St. Peter Sandstone, water bearing	175	790
Prairie du Chien Group		
Shakopee Dolomite	55	845
Oneota Dolomite	205	1050
<b>CAMBRIAN SYSTEM</b>		
Eminence-Potosi Dolomite	185	1235
Franconia Formation		
Dolomite and sandstone	140	1375
Ironton-Galesville Sandstone		
Sandstone, water bearing	165	1540
Eau Claire Formation		
Shale and sandstone	25	1565

A 21-in. diameter hole was drilled to a depth of 303 ft and finished 15 in. in diameter from 303 to 1565 ft. The well is cased with 17-in. OD pipe from about 0.4 ft above the wellhouse floor to a depth of 303 ft (cemented in).

Upon completion, the well reportedly produced 1250 gpm with a drawdown of 100 ft from a nonpumping water level of 165 ft.

In 1927, the driller sealed in the 17-in. pipe with cement grout, and the nonpumping water level was reported to be 165 ft.

In 1933, the Layne-North Central Co., Chicago, shot the well with 4 charges of nitroglycerin (25 qt each) at depths of 1207, 1321, 1435, and 1549 ft. The depth was reported to be 1558 ft after shooting.

On August 24, 1933, the nonpumping water level was reported to be 165 ft below land surface.

In 1937, this well was cleaned out and the pump repaired.

On September 8, 1938, the well reportedly produced 940 gpm with a drawdown of 166 ft from a nonpumping water level of 261 ft.

Nonpumping water levels were reported to be 259 ft below the pump base on July 25, 1941, and 306 ft on March 7, 1947.

On March 18, 1947, the J. P. Miller Artesian Well Co., Brookfield, shot the well with 500 lb of nitrogel at a depth of 1530 ft. On April 9, 1947, a second shot of 500 lb of nitrogel was exploded at a depth of 1492 ft. A carload of sand was removed and the well cleaned out to 1536 ft.

In October 1952, after the pump shaft was found to be broken, the J. P. Miller Artesian Well Co. shot the well with 228 lb of 100 percent nitrogel and 5 lb of 60 percent primer between the depths of 1530 and 1540 ft. After the well was cleaned out to 1560 ft, the nonpumping water level was reported to be 342 ft on January 15, 1953. The pump was repaired and reinstalled.

In June 1961, this well was cleaned and the pump was lowered.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 54925) rated at 1000 gpm, and powered by a 250-hp 1800 rpm U. S. electric motor (Serial No. 1078963). The well is equipped with 768 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C003738) of a sample collected April 2, 1979, after pumping for 24 hr at 850 gpm, showed the water to have a hardness of 255 mg/l, total dissolved minerals of 510 mg/l, and an iron content of 0.2 mg/l.

WILLIAMSON AVE. WELL (also known as Well 4D), open to the Cambrian-Ordovician aquifer, was completed in 1924 to a depth of 1608 ft (reported to be 1613 ft in 1929, drilled and bailed out to 1609 ft in 1945, and cleaned out to 1575 ft in 1957) by the Sewell Well Co., St. Louis, Mo. The well is located at 806 Williamson Ave. near Charlesworth Ave., approximately 1250 ft N and 180 ft E of the SW corner of Section 2, T35N, R10E. The land surface elevation at the well is approximately 558 ft.

A sample study log of the Williamson Ave. Well furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Glacial drift	15	15
<b>SILURIAN SYSTEM</b>		
Niagaran Series	85	100
Alexandrian Series		
Kankakee Dolomite	30	130
Elwood Dolomite	25	155
Wilhelmi Formation	50	205
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone		
Dolomite	30	235
Scales Shale	80	315
Galena Group		
Dolomite	205	520

Strata	Thickness (ft)	Depth (ft)
Piatteville Group		
Dolomite	130	650
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	495	1145
Shale and chert	25	1170
CAMBRIAN SYSTEM		
Potosi Dolomite	60	1230
Franconia Formation		
Sandstone and dolomite	115	1345
Ironton-Galesville Sandstone		
Sandstone, water bearing	185	1530
Eau Claire Formation		
Sandstone and shale	78	1608

Originally, a 19-in. diameter hole was drilled to a depth of 346 ft, reduced to 17 in. between 346 and 1161 ft, and finished 12 in. in diameter from 1161 to 1608 ft. The well was cased with 16-in. pipe from land surface to a depth of 346 ft and a 13-in. liner from 1101 ft to a depth of 1161 ft. In 1929 after shooting, the well was reported to be cased with 20-in. ID pipe from land surface to a depth of 20 ft, 15.2-in. pipe from land surface to a depth of 391 ft (cemented in), 8-in. liner from 1260 ft to a depth of 1613 ft (from 1408 to 1568 ft the liner was perforated). After rehabilitation in 1945, the well was reported to be 19.2 in. in diameter from 0 to 386 ft, 15.2 in. between 386 and 1170 ft, and 12 in. between 1170 and 1609 ft. The casing consists of 20-in. OD pipe from land surface to a depth of 20 ft, 16-in. OD pipe from land surface to a depth of 386 ft, 13-in. OD liner from 1108.5 ft to a depth of 1170 ft, and 10-in. ID liner from 1170 ft to a depth of 1414.8 ft. In 1957, the old liners were removed and a new 16-in. OD pipe was installed from land surface to a depth of 367 ft (cemented in) and a 13-in. OD liner was placed from 1105 ft to a depth of 1170 ft.

In March 1927, after pumping at a rate of 765 gpm, the drawdown was 100 ft from a nonpumping water level of 195 ft.

In 1929, the S. B. Geiger & Co., Chicago, shot this well with 1500 lb of dynamite at a depth of about 1550 ft. The well was cleaned and the depth was reported to be 1613 ft. New casing was also installed during this rehabilitation.

In September 1938, the well reportedly produced 960 gpm with a pumping water level below 400 ft from a nonpumping water level of 209 ft.

From April 24 to November 29, 1945, this well was rehabilitated by the J. P. Miller Artesian Well Co., Brookfield. The well was shot in the Galesville Sandstone at depths of 1525, 1514, 1500, 1489, and 1458 ft. After shooting, the well was drilled and bailed out to 1609 ft.

A production test was conducted by the State Water Survey on February 15, 1946. After 9.8 hr of pumping at rates ranging from 1005 to 825 gpm, the pumping water level was 453 ft below the pump base. Fourteen hr after pumping was stopped, the water level had recovered to 348 ft.

Nonpumping water levels were reported to be 410 ft below the pump base after an idle period of 36 min on October 4, 1946, and 452 ft in September 1951.

In February 1957, the J. P. Miller Artesian Well Co. removed the old liners and installed a new 16-in. casing and a 13-in. liner. The well was then shot at five levels as follows: 228 lb of nitrogel and 8 lb of dynamite between 1515 and 1525 ft, 228 lb of nitrogel and 8 lb of dynamite between 1495 and 1505 ft, 285 lb of nitrogel and 8 lb of dynamite between 1475 and 1485 ft, 242 lb of nitrogel and 12 lb of dynamite between 1557 and 1570 ft, and 228 lb of nitrogel and 8 lb of dynamite between 1525 and 1535 ft. The well was cleaned out to 1575 ft and the nonpumping water level was reported to be 438 ft.

On February 16, 1958, the nonpumping water level was reported to be 422 ft and the well was placed back in operation.

On October 8, 1980, the nonpumping water level was reported to be 677 ft.

The pumping equipment presently installed consists of a 200-hp 1775 rpm General Electric motor (Serial No. 6328604), a 12-in., 10-stage Peerless turbine pump (No. 31940) set at 860 ft, rated at 1000 gpm at about 463 ft head, and has 860 ft of 10-in. column pipe. The well is equipped with 860 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B052860) of a sample collected April 29, 1981, after pumping for 24 hr at 934 gpm, showed the water to have a hardness of 253 mg/l, total dissolved minerals of 491 mg/l, and an iron content of 0.21 mg/l.

CAMPBELL ST. WELL (also known as Well 9D), open to the Cambrian-Ordovician aquifer, was completed in August 1964 to a depth of 1671 ft (cleaned out to 1600 ft in 1965) by the J. P. Miller Artesian Well Co., Brookfield. The well is located at 1919 Campbell St. on the west side of the city, approximately 1200 ft N and 2450 ft W of the SE corner of Section 7, T35N, R10E. The land surface elevation at the well is approximately 647 ft.

A drillers log of the Campbell St. Well follows:

Strata	Thickness (ft)	Depth (ft)
Drift	60	60
Light lime hard	5	65
Lime changing gray	10	75
Dark gray lime, hard	35	110
Lime light gray	20	130
Lime changing to light brown	20	150
Gray lime	40	190
Gray lime, medium	10	200
Gray shaly lime	30	230
Shale and dark lime	10	240
Gray shaly lime	40	280
Squeeze	5	285
Lime streak	5	290
Gray shale (water at 75 ft)	20	310
Dark brown shale	53	363
Brown lime, medium	117	480
Light brown lime, medium	80	560
Brown lime	30	590
Dark green lime	14	604

*Strata (continued)*

	Thickness (ft)	Depth (ft)
Brown lime, hard	16	620
Hard brown lime	20	640
Light brown lime	15	655
Brown lime	45	700
Sandy lime	4	704
St. Peter sand	271	975
Medium hard sand	8	983
Soft sand	47	1030
Hard brown sand	9	1039
Shale, blue	5	1044
Hard lime shells	5	1049
Green shale	46	1095
Sandy lime and shale	15	1110
Shaly lime	5	1115
Lime and shale	15	1130
White lime	20	1150
Gray sand hard sharp	5	1155
Gray sand lime streaks	10	1165
Lime and shale breaks	35	1200
Shale, sand and lime	10	1210
Shale, lime shells	10	1220
Broken lime	30	1250
Light gray lime hard	50	1300
Green lime shaly	25	1325
Green shaly lime	50	1375
Gray lime	25	1400
Light brown lime	25	1425
Light brown sandy lime hard	23	1448
Sand light brown	2	1450
White sand	40	1490
Medium white sand	10	1500
Soft sand	46	1546
Hard sand	4	1550
Medium sand	25	1575
Hard sand	20	1595
Medium sand	18	1613
Black lime hard	11	1624
Green lime and shale	2	1626
Green and blue shale, tough	24	1650
Gray shaly lime	21	1671

A 25-in. diameter hole was drilled to a depth of 404 ft, reduced to 19 in. between 404 and 1103 ft, reduced to 17 in. between 1103 and 1256 ft, and finished 13.2 in. in diameter from 1256 to 1671 ft. The well is cased with 26-in. drive pipe from land surface to a depth of 63.5 ft, 20-in. pipe from land surface to a depth of 401 ft (cemented in), 18-in. liner from 1006 ft to a depth of 1103 ft, and 16-in. liner from 1134 ft to a depth of 1256 ft.

The well was shot at seven levels as follows: 206 lb from 1602 to 1608 ft, 408 lb from 1583 to 1595 ft, 408 lb from 1566 to 1578 ft, 408 lb from 1548 to 1560 ft, 408 lb from 1530 to 1542 ft, 409 lb from 1510 to 1522 ft, and 610 lb from 1553 to 1570 ft.

A production test was conducted by the driller on August 31-September 1, 1964. After 25 hr of pumping at a rate of 1059 gpm, the drawdown was 176 ft from a non-pumping water level of 487 ft below land surface. After testing, the well was shot with 100 lb of dynamite.

A second production test was conducted on November 2-3, 1964, by representatives of the driller and Casler & Associates, Consulting Engineers.\* After 4.8 hr of pumping at rates of

600 to 812 gpm, the drawdown was 111 ft from a non-pumping water level of 501 ft below land surface. Pumping was continued for 16.6 hr at rates ranging from 1001 to 968 gpm with a drawdown of 144 ft. After an additional 3.4 hr of pumping at rates ranging from 728 to 1319 gpm, the maximum drawdown was about 157 ft. After pumping was stopped for 3.8 hr, the water level had recovered to 548 ft.

In December 1964, the well reportedly produced 1000 gpm for 8 hr with a drawdown of 124 ft from a nonpumping water level of 532 ft below land surface.

After the well was cleaned out in 1965 to a depth of 1600 ft, a production test was conducted by the Wehling Well Works, Beecher, on December 16-21, 1965. After 122.5 hr of pumping at rates ranging from 1746 to 1416 gpm, the final drawdown was 193 ft from a nonpumping water level of 549 ft below land surface.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 252089) set at 915 ft, operated at 1210 gpm, and powered by a 600-hp 1780 rpm U. S. Holo-shaft electric motor. The well is equipped with 915 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B42693) of a sample collected April 22, 1977, after pumping for 24 hr at 1120 gpm, showed the water to have a hardness of 207 mg/l, total dissolved minerals of 485 mg/l, and an iron content of 0.3 mg/l. Hydrogen sulfide was apparent when previous samples were collected.

ESSINGTON ROAD WELL (also known as Well 10D), open to the Cambrian-Ordovician aquifer, was completed in 1970 to a depth of 1572 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located west of Essington Road, south of Twin Oaks Drive, approximately 700 ft N and 454 ft W of the SE corner of Section 11, T35N, R9E. The land surface elevation at the well is approximately 610 ft.

A drillers log of the Essington Road Well follows:

Strata	Thickness (ft)	Depth (ft)
Sand and gravel	40	40
Dolomite	170	210
Dolomite and shale	10	220
Shale, some dolomite	20	240
Shale	70	310
Limestone	325	635
Sandstone	145	780
Limestone and shale	80	860
Limestone	375	1235
Limestone and shale	45	1280
Sandstone	20	1300
Limestone	30	1330
Limestone and shale	20	1350
Limestone	40	1390
Sandstone	140	1530
Limestone and shale	42	1572

A 30-in. diameter hole was drilled to a depth of 43 ft, reduced to 25.5 in. between 43 and 380 ft, reduced to 19.2 in. between 380 and 860 ft, and finished 15.2 in. in diameter from 860 to 1572 ft. The well is cased with 30-in. pipe from land surface to a depth of 43 ft, 26-in. pipe from land surface to a depth of 59 ft, 20-in. pipe from land surface to a depth of 363 ft (cemented in), and 16-in. liner from 760 ft to a depth of 860 ft.

The well was shot at eight levels as follows: 200 lb from 1510 to 1520 ft, 250 lb from 1493 to 1505 ft, 250 lb from 1471 to 1483 ft, 250 lb from 1449 to 1461 ft, 250 lb from 1429 to 1441 ft, 250 lb from 1503 to 1515 ft, 250 lb from 1483 to 1493 ft, and 300 lb from 1458 to 1471 ft.

A production test was conducted by the driller on June 12, 1970. After 4.2 hr of pumping at rates ranging from 490 to 800 gpm, the drawdown was 122 ft from a nonpumping water level of 510 ft below the top of the casing.

A second production test was conducted by the driller on June 15, 1970. After 16 hr of pumping at rates ranging from 500 to 1300 gpm, the final drawdown was 202 ft from a nonpumping water level of 510 ft below the top of the casing.

The pumping equipment presently installed is a Peerless turbine pump set at 850 ft, rated at 1200 gpm at about 960 ft TDH, and powered by a 500-hp Ideal electric motor. The well is equipped with 850 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C003736) is for a water sample from the well collected April 2, 1979, after pumping for 24 hr at 1300 gpm.

#### ESSINGTON ROAD WELL, LABORATORY NO. C003736

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.8		Silica	SiO <sub>2</sub>	8	
Manganese	Mn	0.00		Fluoride	F	1.3	0.07
Ammonium	NH <sub>4</sub>	1.4	0.08	Boron	B	0.7	
Sodium	Na	60	2.61	Cyanide	CN	0.01	
Potassium	K	20.2	0.52	Nitrate	NO <sub>3</sub>	27.4	0.44
Calcium	Ca	60	2.99	Chloride	Cl	29	0.82
Magnesium	Mg	22	1.81	Sulfate	SO <sub>4</sub>	87	1.81
				Alkalinity(asCaCO <sub>3</sub> )		260	5.20
Arsenic	As	0.000		Hardness(asCaCO <sub>3</sub> )		242	4.84
Barium	Ba	<0.1					
Cadmium	Cd	<0.01		Total dissolved			
Chromium	Cr	<0.02		minerals		484	
Copper	Cu	<0.02					
Lead	Pb	<0.01					
Mercury	Hg	0.0000					
Nickel	Ni	<0.1					
Selenium	Se	0.00					
Silver	Ag	<0.02					
Zinc	Zn	0.04		pH (as rec'd)		8.0	

ROONEY SITE WELL (also known as Well 11D), open to the Cambrian-Ordovician aquifer except for the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in December 1975 to a depth of 1623 ft by the Wehling Well Works, Beecher. This well was not in use

during 1980. The well is located about 75 ft north and 145 ft west of the intersection of Ingalls Ave. and Gaylord Road, approximately 2540 ft S and 1495 ft W of the NE corner of Section 1, T35N, R9E. The land surface elevation at the well is approximately 619 ft.

A drillers log of the Rooney Site Well follows:

Strata	Thickness (ft)	Depth (ft)
Drift	18	18
Lime	57	75
White lime	35	110
Gray lime	10	120
Gray and brown lime	15	135
Lime	105	240
Lime dark gray with shale	15	255
Shale dark gray	15	270
White lime with shale	5	275
Dark gray shale	90	365
Lime	70	435
Brown lime	85	520
Lime	85	605
Brown lime	55	660
Brown and white lime with sand	35	695
Sand	25	720
St. Peter sand	40	760
Sand, shale "Gumbo"	20	780
Sand shale	20	800
Sand	55	855
White lime with sand and shale	50	905
Brown lime with sand and shale	30	935
Sand with shale and lime	50	985
Lime with sand	40	1025
Lime	270	1295
Lime, sand and shale	172	1467
Sand with some lime	23	1490
Sand	90	1580
Shale	10	1590
Shale with lime and sand	33	1623

A 20-in. diameter hole was drilled to a depth of 22 ft, reduced to 19 in. between 22 and 1014 ft, and finished 15 in. in diameter from 1014 to 1623 ft. The well is cased with 20-in. black steel pipe from land surface to a depth of 22 ft and 16-in. black steel pipe from land surface to a depth of 1014 ft (cemented in).

This well was shot with 560 qt of nitrogel in 7 shots plus 320 qt of nitrogel in 3 shots between the depths of 1515 and 1572 ft. A production test was then conducted by the driller on March 25-26, 1976. After 24 hr of pumping at rates ranging from 1057 to 416 gpm, the drawdown was 144 ft from a nonpumping water level of 640 ft. After this test, this well was shot again with 1100 lb of explosives between 1440 and 1480 ft and with 300 lb of explosives between 1532 and 1542 ft.

A second production test was conducted by the driller on August 2-3, 1976. After 23.5 hr of pumping at rates ranging from 810 to 1193 gpm, the final drawdown was 157 ft from a nonpumping water level of 647 ft below land surface.

The pumping equipment presently installed is a Johnston turbine pump set at 950 ft, rated at 1000 gpm, and powered by a 500-hp electric motor.



A partial analysis of a sample (Lab. No. 201597) collected during the initial production test, showed the water to have a hardness of 222 mg/l, total dissolved minerals of 470 mg/l, and an iron content of 0.5 mg/l.

HOMART SITE WELL (also known as Well 12D), open to the Cambrian-Ordovician aquifer except for the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in October 1975 to a depth of 1557 ft by the Wehling Well Works, Beecher. This well was not in use during 1980. The well is located about 350 ft south and 80 ft east of the intersection of Central Drive and Glasgow St., approximately 2415 ft N and 1415 ft E of the SW corner of Section 25, T36N, R9E. The land surface elevation at the well is approximately 602 ft.

A drillers log of the Homart Site Well follows:

Strata	Thickness (ft)	Depth (ft)
Drift	25	25
Lime	80	105
Lime with green shale	20	125
Lime	111	236
Lime with shale	9	245
Shale	80	325
Shale with lime	5	330
Lime with shale	10	340
Lime	115	455
Lime with sand	80	535
Lime	148	683
Sand	127	810
Sand with lime stringers	30	840
Sand	60	900
Sand with shale	15	915
Sand, shale and lime	5	920
Lime and shale	5	925
Shale with lime	10	935
Lime with shale	5	940
Lime	115	1055
Lime white, brown	15	1070
Lime	75	1145
Hard lime	35	1180
Lime	50	1230
Lime with sand	45	1275
Sand with lime	70	1345
Sand	15	1360
Lime with sand	190	1550
Shale	7	1557

A 20-in. diameter hole was drilled to a depth of 34 ft, reduced to 19 in. between 34 and 964 ft, and finished 15 in. in diameter from 964 to 1557 ft. The well is cased with 20-in. black steel pipe from land surface to a depth of 34 ft and 16-in. black steel pipe from land surface to a depth of 964 ft (cemented in).

After the well was shot with 455 qt of nitrogel between 1450 and 1515 ft, a production test was conducted by the driller on March 1-2, 1976. After 22.8 hr of pumping at rates ranging from 960 to 1406 gpm, the maximum drawdown was 100 ft from a nonpumping water level of 570 ft. Thirty min after pumping was stopped, the water level had recovered to 599 ft.

A second production test was conducted by the driller on April 6-7, 1976. After 20 hr of pumping at rates of 986 to 1706 gpm, the drawdown was 110 ft from a nonpumping water level of 570 ft. Pumping was continued for 7 hr at rates ranging from 1496 to 853 gpm with a final drawdown of 70 ft.

A third production test was conducted by the driller on May 4-5, 1976. After 20.2 hr of pumping at rates ranging from 820 to 1980 gpm, the drawdown was 100 ft from a nonpumping water level of 573 ft.

The pumping equipment presently installed is a Johnston vertical turbine pump set at 800 ft, rated at 1000 gpm, and powered by a 400-hp Ideal electric motor.

A partial analysis of a sample (Lab. No. 201598) collected during the second production test, after pumping for 25 hr at rates of 986 to 1706 gpm, showed the water to have a hardness of 228 mg/l, total dissolved minerals of 423 mg/l, and an iron content of 0.9 mg/l.

*A description of the wells in the Hadley Bedrock Valley follows:*

In 1941, it was noted that during the previous 30 years, nonpumping water levels in the city wells had lowered 200 to 250 ft. In 1942-43, a study was made on two large buried bedrock valleys east of Joliet, which roughly coincide with the existing valleys of Spring and Hickory Creeks and a third, called Hadley Bedrock Valley, which forms a connecting channel between the two. As a result of field studies and reports on the respective hydrologic and geologic factors involved, 11 test wells and a number of observation wells were drilled in an area extending 1 mile in width and from 8 to 10 miles northeast of Joliet. Pumping tests were conducted to determine the potential capabilities of the glacial drift and shallow bedrock aquifers. As a result of this study, 5 gravel wells and 3 deep sandstone wells were constructed.

GRAVEL WELL NO. 1 (Site 6), finished in sand and gravel, was completed in May 1950 to a depth of 103 ft by the Layne-Western Co., Aurora. The well is located east of Gougar Road about 0.4 mile north of U. S. Route 6, approximately 562 ft S and 740 ft E of the NW corner of Section 5, T35N, R11E. The land surface elevation at the well is approximately 650 ft.

A sample study log of Gravel Well No. 1 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
QUATERNARY SYSTEM		
Pleistocene Series		
Soil, silty, brownish black	1	1
Gravel, sandy, white to gray, dark yellowish orange at top; numerous dolomite pebbles and granules; few calcite grains	74	75
Gravel, light gray to buff; numerous dolomite pebbles, average 5 mm., maximum 8 mm.	30	105

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Sand and gravel, silty; numerous dolomite pebbles and grains; few calcite grains	10	115
Sand, slightly silty, fine to coarse, numerous dolomite grains; few calcite grains	10	125

A 48-in. diameter hole was drilled to a depth of 25 ft and finished 36 in. in diameter from 25 to 103 ft. The well is cased with 48-in. surface pipe from land surface to a depth of 25 ft, 36-in. pipe from land surface to a depth of 50 ft, and 18-in. pipe from about 0.8 ft above land surface to a depth of 63 ft followed by 40 ft of 18-in. No. 6 (0.080 in.) Layne brass shutter screen. The annulus between the 48- and 36-in. casings is filled with cement from 0 to 25 ft and the annulus between the 36- and 18-in. casings and between the bore hole and casing-screen assembly is filled with selected gravel from 0 to 103 ft.

Upon completion, the well reportedly produced 970 gpm for 14 hr with a drawdown of 60 ft from a nonpumping water level of 9 ft below the pump base.

A production test using four observation wells was conducted on June 21-22, 1950, by representatives of the driller, the State Water Survey, and Consoer, Townsend & Associates, Consulting Engineers. After 2.6 hr of pumping at rates of 508 to 950 gpm, the drawdown was 19 ft from a nonpumping water level of 4 ft below land surface. Pumping was continued for 7.5 hr at rates ranging from 717 to 1148 gpm with a drawdown of 25 ft. After an additional 14.2 hr of pumping at a rate of 1280 gpm, the final drawdown was 31 ft. Twenty min after pumping was stopped, the water level had recovered to 11 ft.

In May 1962, the pump was pulled and the well was cleaned to the bottom. The column pipe and screen were replaced where needed.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73353) set at about 85 ft, rated at 1000 gpm, and powered by a 50-hp 1800 rpm U. S. electric motor (Serial No. 818311). The well is equipped with 85 ft of airline.

A mineral analysis of a sample (Lab. No. 157250) collected April 13, 1962, showed the water to have a hardness of 731 mg/l, total dissolved minerals of 905 mg/l, and an iron content of 2.9 mg/l.

GRAVEL WELL NO. 2 (Site 2), finished in sand and gravel, was completed in May 1950 to a depth of 90 ft by the Layne-Western Co., Aurora. The well is located on the south side of U. S. Route 6 about 0.2 mile east of Gougar Road, approximately 2500 ft N and 980 ft E of the SW corner of Section 5, T35N, R11E. The land surface elevation at the well is approximately 668 ft.

A 48-in. diameter hole was drilled to a depth of 25 ft and finished 36 in. in diameter from 25 to 90 ft. The well

is cased with 48-in. steel pipe from land surface to a depth of 25 ft, 36-in. pipe from land surface to a depth of 50 ft, and 18-in. steel pipe from about 3 ft above the pumphouse floor to a depth of 60 ft followed by 30 ft of 18-in. No. 6 (0.080 in.) Layne bronze shutter screen. The annulus between the 48- and 36-in. casings is filled with cement from 0 to 25 ft and the annulus between the 36- and 18-in. casings and between the bore hole and casing-screen assembly is filled with 1/16 to 1/8 in. gravel from 0 to 90 ft.

A production test using one observation well was conducted on May 11-12, 1950, by representatives of the driller and the State Water Survey. After 7.9 hr of pumping at rates of 195 to 812 gpm, the drawdown was 47.5 ft from a nonpumping water level of 28.5 ft below land surface. Fifteen min after pumping was stopped, the water level had recovered to 30.5 ft. Pumping was then continued for 15.3 hr at a rate of 609 gpm with a final drawdown of 34.5 ft.

In November 1963, the pump was pulled and the well was cleaned to the bottom. Parts were replaced where needed.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73351) set at 70 ft, rated at 600 gpm, and powered by a 50-hp 1800 rpm U. S. electric motor (Serial No. 817302). The well is equipped with 70 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B052947) of a sample collected April 30, 1981, after pumping for 24 hr at 575 gpm, showed the water to have a hardness of 498 mg/l, total dissolved minerals of 604 mg/l, and an iron content of 2.23 mg/l.

GRAVEL WELL NO. 3 (Site 5), finished in sand and gravel, was completed in August 1950 to a depth of 83 ft by the Layne-Western Co., Aurora. The well is located east of Gougar Road about 0.5 mile south of U. S. Route 6, approximately 60 ft S and 540 ft E of the NW corner of Section 8, T35N, R11E. The land surface elevation at the well is approximately 674 ft.

A drillers log of Gravel Well No. 3 follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Water	4	4
Concrete	1.5	5.5
Sand, rock cuttings	18.5	24
Concrete	3	27
Clay	21.5	48.5
Coarse gravel and boulders	34.5	83
Blue clay below		

A 48-in. diameter hole was drilled to a depth of 25 ft and finished 36 in. in diameter from 25 to 83 ft. The well is cased with 48-in. steel pipe from land surface to a depth of 25 ft, 36-in. pipe from 2 ft above land surface to a depth of 50.8 ft, and 18-in. steel pipe from about 1.5 ft above the pumphouse floor to a depth of 58 ft followed by 25 ft of 18-in. No. 6 (0.080 in.) Layne bronze shutter screen. The

annulus between the 48- and 36-in. casings is filled with cement from 0 to 25 ft and the annulus between the 36- and 18-in. casings and between the bore hole and casing-screen assembly is filled with pea gravel and flint sand from 0 to 83 ft.

A production test using one observation well was conducted on August 14, 1950, by representatives of the driller and Consoer, Townsend & Associates, Consulting Engineers. After 1.3 hr of pumping at rates of 421 to 433 gpm, the drawdown was 6.6 ft from a nonpumping water level of 35.3 ft below land surface. Pumping was continued for 1.7 hr at a rate of 618 gpm with a drawdown of 10.5 ft. Pumping was continued for 1.7 hr at a rate of 805 gpm with a drawdown of 14.0 ft. After an additional 19.3 hr of pumping at rates ranging from 1007 to 1227 gpm, the final drawdown was 27.0 ft. Twenty min after pumping was stopped, the water level had recovered to 43.8 ft.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73352) set at 78 ft, rated at 1200 gpm, and powered by a 50-hp 1800 rpm U. S. electric motor (Serial No. 818313). The well is equipped with 78 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C007017) of a sample collected April 9, 1974, after pumping for 8 hr at 850 gpm, showed the water to have a hardness of 544 mg/l, total dissolved minerals of 634 mg/l, and an iron content of 2.4 mg/l.

GRAVEL WELL NO. 4 (Site 9), finished in sand and gravel, was completed in September 1950 to a depth of 113 ft by the Layne-Western Co., Aurora. The well is located about 0.8 mile north of U. S. Route 6 and 0.7 mile east of Gougar Road, approximately 1863 ft N and 1700 ft W of the SE corner of Section 32, T36N, R11E. The land surface elevation at the well is approximately 688 ft.

A drillers log of Gravel Well No. 4 follows:

Strata	Thickness (ft)	Depth (ft)
Top soil	1	1
Blue clay and boulders	39	40
Boulders	30	70
Fine sand	40	110
Cemented gravel	2	112
Blue clay below		

A 48-in. diameter hole was drilled to a depth of 25 ft and finished 36 in. in diameter from 25 to 113 ft. The well is cased with 48-in. pipe from land surface to a depth of 25 ft, 36-in. pipe from 1.5 ft above land surface to a depth of 52 ft, and 18-in. pipe from 2 ft above land surface to a depth of about 73 ft followed by 40 ft of 18-in. No. 6 (0.080 in.) Layne brass shutter screen. The annulus between the 48- and 36-in. casings is filled with cement from 0 to 25 ft and the annulus between the 36- and 18-in. casings and between the bore hole and casing-screen assembly is filled with pea gravel and flint sand from 0 to 113 ft.

A production test using one observation well was conducted on September 8-9, 1950, by representatives of the driller and Consoer, Townsend & Associates, Consulting Engineers. After 17 hr of pumping at a rate of 1130 gpm, the drawdown was 22.0 ft from a nonpumping water level of 34.8 ft below land surface. Pumping was continued for 6 hr at rates of 901 to 458 gpm with a drawdown of 7.0 ft. After an additional 1.5 hr of pumping at rates of 1120 to 1125 gpm, the final drawdown was 21.0 ft. Ten min after pumping was stopped, the water level had recovered to 35.0 ft.

In 1963, the pump was pulled and the well was cleaned to the bottom. Parts were replaced where needed.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73355) set at 101 ft, rated at 1000 gpm, and powered by a 50-hp 1800 rpm U. S. electric motor (Serial No. 818581). The well is equipped with 101 ft of airline.

A partial analysis of a sample (Lab. No. 163084) collected June 1, 1964, showed the water to have a hardness of 540 mg/l, total dissolved minerals of 676 mg/l, and an iron content of 1.6 mg/l.

GRAVEL WELL NO. 5 (Site 3), finished in sand and gravel, was completed in August 1950 to a depth of 94 ft by the Layne-Western Co., Aurora. The well is located about 0.6 mile north of U. S. Route 6 and 0.5 mile east of Gougar Road, approximately 579 ft N and 2740 ft E of the SW corner of Section 32, T36N, R11E. The land surface elevation at the well is approximately 662 ft.

A drillers log of Gravel Well No. 5 follows:

Strata	Thickness (ft)	Depth (ft)
Clay	25	25
Blue gravelly clay	5	30
Gravel with large rocks	5	35
Hard packed gravel	20	55
Gravel	15	70
Loose gravel	25	95

A 48-in. diameter hole was drilled to a depth of 25 ft and finished 36 in. in diameter from 25 to 94 ft. The well is cased with 48-in. steel pipe from land surface to a depth of 25 ft, 36-in. pipe from land surface to a depth of 50 ft, and 18-in. steel pipe from about 0.4 ft above the wellhouse floor to a depth of about 59 ft followed by 35 ft of 18-in. No. 6 (0.080 in.) Layne shutter screen. The annulus between the 48- and 36-in. casings is filled with cement from 0 to 25 ft and the annulus between the 36- and 18-in. casings and between the bore hole and casing-screen assembly is filled with gravel from 0 to 94 ft.

A production test using one observation well was conducted on August 21-22, 1950, by representatives of the driller and Consoer, Townsend & Associates, Consulting Engineers. After 18 hr of pumping at a rate of 1018 gpm, the drawdown was 47.0 ft from a nonpumping water level of 16.8 ft below land surface. Pumping was continued for 5.5 hr at rates of 805 to 408 gpm with a drawdown of 22.0

ft. After an additional 30 min of pumping at an increased rate of 1029 gpm, the final drawdown was 47.5 ft. Twenty min after pumping was stopped, the water level had recovered to 18.3 ft.

In 1963, the pump was pulled and the well was cleaned to the bottom. The column pipe was replaced where needed.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73354) set at about 85 ft, rated at 1000 gpm, and powered by a 50-hp 1800 rpm U. S. electric motor (Serial No. 818313). The well is equipped with 84 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B43425) is for a water sample from the well collected April 27, 1977, after 24 hr of pumping at 420 gpm.

#### GRAVEL WELL NO. 5, LABORATORY NO. B43425

		mg/l	me/l			mg/l	me/l
Iron	Fe	2.4		Silica	SiO <sub>2</sub>	14	
Manganese	Mn	0.04		Fluoride	F	0.3	0.02
Ammonium	NH <sub>4</sub>	0.28	0.02	Boron	B	0.3	
Sodium	Na	21	0.91	Cyanide	CN	0.00	
Potassium	K	3.3	0.08	Nitrate	NO <sub>3</sub>	0.0	0.00
Calcium	Ca	140	6.99	Chloride	Cl	4.4	0.12
Magnesium	Mg	58	4.77	Sulfate	SO <sub>4</sub>	290	6.03
				Alkalinity (as CaCO <sub>3</sub> )		330	6.60
Arsenic	As	0.00		Hardness (as CaCO <sub>3</sub> )		600	12.00
Barium	Ba	0.0					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		791	
Copper	Cu	0.01					
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.3	

ROCK WELL NO. 1 (Site 6, Warren — also known as Well 8D), open to the Cambrian-Ordovician aquifer, was completed in August 1949 to a depth of 1660 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located north of U. S. Route 6 and east of Gougar Road in the same pumphouse as Gravel Well No. 1, approximately 562 ft S and 730 ft E of the NW corner of Section 5, T35N, R11E. The land surface elevation at the well is approximately 648 ft.

A drillers log of Rock Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Surface material	8	8
Gravel	8	16
Sand and gravel	12	28
Sand	62	90
Gravel	15	105
Blue mud and gravel	11	116
Sand and gravel	14	130
Gray lime	205	335
Lime	10	345
Shale	5	350
Lime and shale breaks	5	355
Shale	6	361
Lime	84	445

Strata (continued)	Thickness (ft)	Depth (ft)
Shale	3	448
Lime	7	455
Shale	2	457
Lime	20	477
Shale	80	557
Lime and shale	11	568
Brown lime	84	652
Gray lime	33	685
Brown lime	128	813
White sand	215	1028
Lime	335	1363
Broken and green shale lime	20	1383
Brown lime	92	1475
Sand	139	1614
Limestone and shale	46	1660

A 28-in. diameter hole was drilled to a depth of 652 ft, reduced to 19 in. between 652 and 1028 ft, and finished 15 in. in diameter from 1028 to 1660 ft. The well is cased with 28-in. ID pipe from land surface to a depth of 140 ft, 19-in. ID pipe from about 0.8 ft above the pumphouse floor to a depth of 652 ft (cemented in), and a 15-in. liner from 955 ft to a depth of 1028 ft.

Between August and November 1949, this well was shot at five levels as follows: 400 lb of nitrogel between 1597.6 and 1610 ft, 400 lb of gel between 1572.6 and 1585 ft, 600 lb of gel and 10 lb primer between 1612 and 1625 ft, 500 lb of gel between 1584 and 1594 ft, and 400 lb of gel between 1563 and 1575 ft. Sandstone was found to be very soft and caved into the well. Bailing was discontinued at 1608 ft in February 1950.

A production test was conducted on March 6-7, 1950, by representatives of the driller, the State Water Survey, and Consoer, Townsend & Associates, Consulting Engineers. After 15.8 hr of pumping at rates ranging from 475 to 1005 gpm, the final drawdown was 164 ft from a nonpumping water level of 427 ft.

A second production test was conducted on March 24-25, 1950, by representatives of the driller and Consoer, Townsend & Associates, Consulting Engineers. After 17.7 hr of pumping at rates ranging from 800 to 1040 gpm, the final drawdown was 160 ft from a nonpumping water level of 425 ft. Four hr after pumping was stopped, the water level had recovered to 444 ft.

From May to November 1962, the pump was pulled and the well was cleaned to the bottom.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73356) set at 950 ft, rated at 900 gpm, and powered by a 300-hp 1800 rpm U. S. electric motor (Serial No. 818501). The well is equipped with 950 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B052854) of a sample collected April 29, 1981, after pumping for 24 hr, showed the water to have a hardness of 251 mg/l, total dissolved minerals of 530 mg/l, and an iron content of 0.37 mg/l.

ROCK WELL NO. 2 (Site 5, Woodruff — also known as Well 7D), open to the Cambrian-Ordovician aquifer, was completed in May 1950 to a depth of 1701 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located east of Gougar Road in the same pumphouse as Gravel Well No. 3, approximately 60 ft S and 530 ft E of the NW corner of Section 8, T35N, R11E. The land surface elevation at the well is approximately 674 ft.

A sample study summary log of Rock Well No. 2 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Till, clayey, dark yellowish orange	14	14
Till, silty, yellowish gray	56	70
Sand, gravel to ½ in., yellowish gray	20	90
Till, silty, gray	15	105
Gravel to ½ in., yellowish gray	7	112
<b>SILURIAN SYSTEM</b>		
Niagaran Series		
Dolomite, silty, light yellowish gray, fine to very fine; dolomite, yellowish gray, pink, green at base	118	230
Alexandrian Series		
Dolomite, light yellowish gray to dark yellowish gray, fine	75	305
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Dolomite, light yellowish gray to yellowish brown, fine	70	375
Shale, dark yellowish gray, weak	60	435
Galena Group		
Dolomite, light yellowish gray, fine to coarse	195	630
Platteville Group		
Dolomite, light yellowish brown, fine to coarse	145	775
Ancell Group		
Glenwood Formation		
Limestone, light yellowish gray to light yellowish brown, very fine; sandstone, gray, fine to coarse, incoherent	20	795
St. Peter Sandstone		
Sandstone, light gray, very fine to coarse, incoherent, shale, yellowish gray to green, weak at base	115	910
Canadian Group		
Shakopee Dolomite		
Dolomite, light yellowish brown, very fine to medium; sandstone, light gray, medium to coarse, incoherent; shale, light green, weak	30	940
Oneota Dolomite		
Dolomite, light yellowish gray, white, pink, fine to coarse; shale, pink, light green, weak at base	260	1200
<b>CAMBRIAN SYSTEM</b>		
Eminence-Potosi Dolomite		
Dolomite, light yellowish brown, fine to medium	163	1363
Franconia Formation		
Dolomite, purplish pink, grayish green, fine to coarse; sandstone light gray, incoherent to compact; dolomite, gray to brownish gray, fine to medium	132	1495

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Ironton Sandstone		
Sandstone, light gray, very fine to coarse, incoherent	55	1550
Galesville Sandstone		
Sandstone, light gray, very fine to very coarse, incoherent to compact	115	1665
Eau Claire Formation		
Dolomite, grayish brown, fine to medium; shale, yellowish gray, weak; sandstone, yellowish gray, fine to compact	35	1700

A 27-in. diameter hole was drilled to a depth of 141 ft, reduced to 20 in. between 141 and 1294 ft, and finished 15 in. in diameter from 1294 to 1701 ft. The well is cased with 28-in. OD pipe from land surface to a depth of 113.5 ft, 20-in. OD pipe from about 0.8 ft above the pumphouse floor to a depth of 549 ft (cemented in), and a 16-in. OD liner from 1183 ft to a depth of 1303 ft.

On May 23, 1950, the well was shot with 400 lb of 100 percent nitrogel and 60 lb of 60 percent dynamite between the depths of 1623 and 1635 ft following which the well was filled with sand up to 1600 ft.

A production test was conducted on June 26, 1950, by representatives of the driller, the State Water Survey, and Consoer, Townsend & Associates, Consulting Engineers. After 6 hr of pumping at rates of 515 to 990 gpm, the drawdown was 95 ft from a nonpumping water level of 457 ft. After a 17-min idle period, pumping was continued for 17.1 hr at rates ranging from 1100 to 1040 gpm with a drawdown of 128 ft. After an additional 1.6 hr of pumping at rates ranging from 905 to 630 gpm, the drawdown was 99 ft.

On June 6, 1960, the pump was removed because of a leak in the shaft tubing. The well had filled up to 1606 ft and 130 cubic yards of sand was removed. The nonpumping water level was reported to be 533 ft.

In 1963, the pump was pulled, the well was cleaned to the bottom, and the pump was placed at a lower depth. Column pipe was replaced as needed.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73358) set at 960 ft, rated at 900 gpm, and powered by a 500-hp 1770 rpm ideal electric motor.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B052853) of a sample collected April 29, 1981, after pumping for 24 hr, showed the water to have a hardness of 261 mg/l, total dissolved minerals of 573 mg/l, and an iron content of 0.33 mg/l.

ROCK WELL NO. 3 (Site 1, Briick Farm — also known as Well 6D), open to the Cambrian-Ordovician aquifer, was completed in March 1950 to a depth of 1656 ft by the J. P. Miller Artesian Well Co., Brookfield. This well is not in use. The well is located east of Farrell Road about 0.6 mile north

of U. S. Route 6, approximately 560 ft N and 570 ft E of the SW corner of Section 31, T36N, R11E. The land surface elevation at the well is approximately 642 ft.

A drillers log of Rock Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Surface	14	14
Gray	26	40
Sand	35	75
Blue mud	23	98
Lime	108	206
Shale	2	208
Lime and shale	10	218
Green shale	9	227
Lime	88	315
Lime and shale breaks	13	328
Shale	10	338
Lime and shale	9	347
Shale	81	428
Lime	31	459
Lime and shale break	4	463
Lime	137	600
Gray lime	30	630
Brown lime	135	765
St. Peter sand	495	1260
Red mud	1	1261
Lime	5	1266
Red mud	6	1272
Red mud and lime	11	1283
Lime shell and red mud	95	1378
Red rock	9	1387
Gray shale and lime	19	1406
Green lime	4	1410
Shale and lime	7	1417
Brown lime	21	1438
Shale	4	1442
Lime	23	1465
Sand	144	1609
Green lime and shale	47	1656

A 25-in. diameter hole was drilled to a depth of 577 ft, reduced to 19 in. between 577 and 1451 ft, and finished 16 in. in diameter from 1451 to 1656 ft. The well is cased with 26-in. steel pipe from land surface to a depth of 104 ft, 20-in. OD steel pipe from about 1.5 ft above the pumphouse floor to a depth of 577 ft (cemented in), and 16-in. steel liner from 1210 ft to a depth of 1451 ft.

On April 21, 1950, the well reportedly produced 660 gpm for 5 hr with a drawdown of 166 ft from a nonpumping water level of 434 ft below land surface.

A production test was conducted on May 25-26, 1950, by representatives of the driller and the State Water Survey. After 20.2 hr of pumping at rates ranging from 355 to 795 gpm, the final drawdown was 153 ft from a nonpumping water level of 447 ft below land surface. Fifty min after pumping was stopped, the water level had recovered to 488 ft.

From November 1961 to March 1962, the pump was pulled and the well was cleaned to the bottom.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 73357) set at 950 ft, rated at 900 gpm, and powered by a 300-hp 1800 rpm U. S. electric motor (Serial No. 818503).

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B43412) is for a water sample from the well collected April 25, 1977, after 24 hr of pumping at 750 gpm.

#### ROCK WELL NO. 3, LABORATORY NO. B43412

		mg/l me/l		mg/l me/l	
Iron	Fe	0.3		Silica	SiO <sub>2</sub> 6.9
Manganese	Mn	0.01		Fluoride	F 1.4 0.07
Ammonium	NH <sub>4</sub>	0.98	0.05	Boron	B 0.7
Sodium	Na	92	4.00	Cyanide	CN <sup>-</sup> 0.00
Potassium	K	14.9	0.38	Nitrate	NO <sub>3</sub> 0.0 0.00
Calcium	Ca	64	3.19	Chloride	Cl <sup>-</sup> 54 1.52
Magnesium	Mg	22	1.81	Sulfate	SO <sub>4</sub> 130 2.70
				Alkalinity (as CaCO <sub>3</sub> )	265 5.30
Arsenic	As	0.00		Hardness (as CaCO <sub>3</sub> )	256 5.12
Barium	Ba	0.0			
Cadmium	Cd	0.00		Total dissolved	
Chromium	Cr	0.00		minerals	578
Copper	Cu	0.03			
Lead	Pb	0.00			
Mercury	Hg	0.0002			
Nickel	Ni	0.0			
Selenium	Se	0.00			
Silver	Ag	0.00			
Zinc	Zn	0.0		pH (as rec'd)	7.6

## JOLIET CORRECTIONAL CENTER

Joliet Correctional Center (est. 1780), located on the north edge of Joliet east of Route 171, installed a public water supply in 1926. One well (No. 2) is in use. In 1952 the estimated average pumpage was 350,000 to 400,000 gpd. In 1979 the estimated average and maximum pumpages were 300,000 and 400,000 gpd, respectively. The water is chlorinated.

WELL NO. 1, finished in the St. Peter Sandstone, was constructed prior to 1917 to a depth of 575 ft and deepened prior to 1933 to a reported depth of about 780 ft. This well was abandoned in 1952. The well is located back of the general kitchen, approximately 2915 ft N and 3240 ft W of the SE corner of Section 3, T35N, R10E. The land surface elevation at the well is approximately 550 ft.

The well is cased with 6-in. pipe to an unknown depth. In 1921, the nonpumping water level was reported to be 35 ft below land surface.

In 1942, the well reportedly produced at a rate of 320 gpm with a drawdown of 10 ft from a nonpumping water level of 292 ft.

On August 4, 1948, during a production test in a new well (Well No. 3), the pump in this well broke suction. The pumping water level was reported to be 538 ft. Four hr after the test was stopped, the water level recovered and the pump resumed production at its normal rate.

A partial analysis of a sample (Lab. No. 97799) collected October 18, 1943, showed the water to have a hardness of 373 mg/l, total dissolved minerals of 848 mg/l, and an iron content of 0.3 mg/l.

WELL NO. 2, open to the Cambrian-Ordovician aquifer except for the Galena-Platteville dolomite and the Glenwood-St. Peter Sandstone, was completed in February 1928 to a depth of 1550 ft (cleaned out in 1970 to a depth of 1533 ft) by the Gray Well Drilling Co., Milwaukee, Wis. The well is located adjacent to the southwest corner of the powerhouse within the walls of the Correctional Center, approximately 2880 ft N and 3265 ft W of the SE corner of Section 3, T35N, R10E. The land surface elevation at the well is approximately 549 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
No record	40	40
SILURIAN SYSTEM		
Niagaran and Alexandrian Series		
Dolomites, water bearing	155	195
ORDOVICIAN SYSTEM		
Maquoketa Group		
Ft. Atkinson Limestone		
Dolomite and some shale	35	230
Scales Shale	75	305
Galena and Platteville Groups		
Dolomites	330	635
Ancell Group		
Glenwood Formation		
Sandstone and dolomite	40	675
St. Peter Sandstone		
Sandstone, water bearing	195	870
Sandy shale and chert	73	943
ORDOVICIAN AND CAMBRIAN SYSTEMS		
Oneota, Eminence, and Potosi Dolomites	287	1230
CAMBRIAN SYSTEM		
Franconia Formation		
Sandstone, dolomitic	155	1385
Ironton-Galesville Sandstone		
Sandstone, water bearing	150	1535
Eau Claire Formation		
Shale and sandstone	15	1550

A 19.2-in. diameter hole was drilled to a depth of 40 ft, reduced to 15 in. between 40 and 552.9 ft, reduced to 12.5 in. between 552.9 and 944 ft, and finished 10 in. in diameter from 944 to 1550 ft. The well is cased with 20-in. OD pipe from land surface to a depth of 8 ft, 16-in. OD pipe

from land surface to a depth of 40 ft, and 12.5-in. OD steel pipe from land surface to a depth of 552.9 ft (cemented in from 0 to 118 ft). Originally, a 10-in. liner pipe was installed from 602 ft to a depth of 944 ft. In 1942, the 10-in. liner pipe was removed and was apparently replaced with 10-in. pipe from 820 ft to a depth of 944 ft. In 1970, the 10-in. liner pipe was removed again and a 10-in. diameter casing was installed from land surface to a depth of 919 ft (cemented in).

In 1931, the nonpumping water level was reported to be 245 ft.

In 1933, after 1 hr of pumping at a rate of 650 gpm, the drawdown was 6.01 ft from a nonpumping water level of 221.80 ft.

On May 15, 1942, this well was shot at five levels as follows: 75 lb at 1305 ft, 75 lb at 1350 ft, 100 lb at 1385 ft, 100 lb at 1470 ft, and 100 lb at 1530 ft.

On August 10-11, 1942, after the well was shot and the 10-in. liner replaced, the well reportedly produced at rates of 280 to 370 gpm for 28 hr with a drawdown of 19 ft from a nonpumping water level of 292 ft.

In 1944, the well reportedly produced 270 gpm with a drawdown of 11 ft from a nonpumping water level of 342 ft.

On August 20, 1948, after 15 min of pumping at a rate of 212 gpm, the drawdown was 5 ft from a nonpumping water level of 417 ft.

On April 19, 1949, the nonpumping water level was reported to be 405 ft. Well No. 1 was in operation at this time.

On March 20, 1950, the well reportedly produced 575 gpm for 2 hr with a drawdown of 18 ft from a nonpumping water level of 412 ft.

In 1970, this well was rehabilitated by the J. P. Miller Artesian Well Co., Brookfield, to increase its capacity. A bridge was found at a depth of 905 ft. The well was cleaned out to a depth of 1533 ft, the 10-in. diameter liner pipe was removed and a new 10-in. casing was installed from land surface to a depth of 919 ft (cemented in).

After rehabilitation, a production test was conducted by the J. P. Miller Artesian Well Co. on September 21, 1970. After 8 hr of pumping at a rate of 500 gpm, the drawdown was 42 ft from a nonpumping water level of 580 ft below land surface.

The pumping equipment presently installed consists of a 125-hp 1800 rpm U. S. electric motor (Serial No. 742100), a 10-in., 20-stage Peerless vertical turbine pump set at 840 ft, rated at 565 gpm, and has 840 ft of 7-in. column pipe. A 20-ft section of 6-in. suction pipe is attached to the pump intake.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B40460) of a sample collected in March 1978, showed the water to have a hardness of 331 mg/l, total dissolved minerals of 750 mg/l, and an iron content of 0.5 mg/l.

WELL NO. 3, open to the Cambrian-Ordovician aquifer, was completed in July 1948 to a depth of 1600 ft (reported to be 1518 ft in 1957) by the J. P. Miller Artesian Well Co., Brookfield. This well was not in use during 1980. The well is located across the street from the Correctional Center in back of the Joliet Reception and Diagnostic Center, approximately 2850 ft N and 2300 ft W of the SE corner of Section 3, T35N, R10E. The land surface elevation at the well is approximately 560 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Top soil	2	2
Broken limestone	20	22
White limestone	43	65
Gray limestone	146	211
Gray limestone and shale breaks	29	240
Shale	72	312
Limestone, gray	64	376
Brown limestone	272	648
St. Peter sandstone	214	862
Shale	8	870
Limestone	5	875
Green shale	2	877
Limestone	17	894
Brown limestone	59	953
White limestone	57	1010
Brown limestone	167	1177
Brown limestone (washing cuttings out)	28	1205
Mud (caving)	11	1216
Limestone	19	1235
Limestone (hole caving)	33	1268
Green limestone	32	1300
Shale	10	1310
Limestone	43	1353
Sandstone and limestone	7	1360
Brown limestone	4	1364
Limestone and sandstone	46	1410
Sandstone	140	1550
Green limestone	26	1576
Limestone and shale	11	1587
Shale	13	1600

A 24-in. diameter hole was drilled to a depth of 453 ft, reduced to 15 in. between 453 and 953 ft, and finished 12 in. in diameter from 953 to 1600 ft. The well is cased with 23-in. OD pipe from 0.5 ft above land surface to a depth of 60.5 ft, 16-in. OD pipe from 2.5 ft above land surface to a depth of 449 ft (cemented in), and a 12-in. OD liner pipe from 848 ft to a depth of 953 ft.

A production test was conducted on August 3-4, 1948, by representatives of the driller and the State Water Survey.

After 20 hr of pumping at rates ranging from 290 to 595 gpm, the drawdown was 90.0 ft from a nonpumping water level of 420.0 ft below the top of the 16-in. casing. Thirty-four min after pumping was stopped, the water level had recovered to 482.0 ft.

On September 8 and 15, and on October 26, 1948, this well was shot with 3 charges of blasting gelatin as follows: 300 lb from 1517 to 1538 ft, 350 lb from 1508 to 1520 ft, and 200 lb from 1471 to 1481 ft. Loose sand was removed and the hole cleaned out to 1600 ft.

After shooting, a production test was conducted on December 7, 1948, by representatives of the driller and the State Water Survey. After 14 hr of pumping at rates ranging from 430 to 654 gpm, the drawdown was 55 ft from a nonpumping water level of 424 ft. Forty min after pumping was stopped, the water level had recovered to 443 ft.

Nonpumping water levels were reported to be 401.2 ft on November 30, 1949, and 444 ft on February 22, 1954.

On February 17, 1971, the J. P. Miller Artesian Well Co. reported that the well produced 750 gpm with a drawdown of 32 ft from a nonpumping water level of 598 ft.

The pumping equipment presently installed consists of a 250-hp U. S. electric motor, a 12-in., 21-stage Peerless turbine pump (Serial No. 75682) set at 770 ft, operated at 800 gpm, and has 770 ft of 7-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B40461) is for a water sample from the well collected in March 1978.

WELL NO. 3, LABORATORY NO. B40461

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.3		Silica	SiO <sub>2</sub>	9.3	
Manganese	Mn	0.04		Fluoride	F	1.4	0.07
Ammonium	NH <sub>4</sub>	0.0	0.05	Boron	B	0.8	
Sodium	Na	95	4.13	Cyanide	CN	0.01	
Potassium	K	15.9	0.41	Nitrate	NO <sub>3</sub>	0.0	0.00
Calcium	Ca	73	3.64	Chloride	Cl	81	2.28
Magnesium	Mg	23	1.89	Sulfate	SO <sub>4</sub>	103	2.14
				Alkalinity(asCaCO <sub>3</sub> )		270	5.40
Arsenic	As	0.00		Hardness(asCaCO <sub>3</sub> )		275	5.50
Barium	Ba	0.1					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		578	
Copper	Cu	0.01					
Lead	Pb	0.00					
Mercury	Hg	0.0001					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.0		pH (as rec'd)		7.6	



## LOCKPORT

The city of Lockport (9985) installed a public water supply in 1896. Three wells (Nos. 2, 4, and 5) are in use and another well (No. 3) is available for emergency use. Water from this supply is also furnished to the north area of the Lockport Township Water System. In 1949 there were 1100 services, all metered; the average pumpage was 325,000 gpd. In 1980 there were about 3024 services, all metered; the average pumpage was 1,378,908 gpd. The water is chlorinated and treated with polyphosphate to keep iron in solution.

WELL NO. 1, open to the Silurian dolomite and the Cambrian-Ordovician aquifer, was completed in 1895 to a depth of 1922 ft (plugged to 1650 ft) by the J. P. Miller Artesian Well Co., Brookfield. This well was abandoned about 1928 and sealed in 1940. The well was located near the intersection of Tenth and Ames Sts., approximately 2620 ft N and 625 ft E of the SW corner of Section 23, T36N, R10E. The land surface elevation at the well is approximately 563 ft.

A correlated drillers log of Well No. 1 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Glacial drift	3	3
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomites	200	203
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Shale	87	290
Galena and Platteville Groups		
Dolomite	340	630
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	230	860
Shale and chert, caving	60	920
Canadian Group		
Oneota Dolomite	70	990
<b>CAMBRIAN SYSTEM</b>		
Eminence Dolomite	70	1060
Potosi Dolomite	140	1200
Franconia Formation		
Sandstone, dolomitic and glauconitic	110	1310
Iron-ton-Galesville Sandstone	165	1475
Eau Claire Formation		
"Shale and marl"	375	1850
Mt. Simon Sandstone		
"Sandstone, water bearing"	72	1922

A 10-in. diameter hole was drilled to a depth of 78.5 ft, reduced to 8 in. between 78.5 and 325 ft, reduced to 7 in. between 325 and 860 ft, reduced to 6 in. between 860 and 1210 ft, and finished 5 in. in diameter from 1210 to 1922 ft. The well was cased with 10-in. pipe from 2 ft above land surface to a depth of 51 ft and 6-in. pipe from 860 ft to a depth of 930 ft.

Upon completion, water flowed from the well at a rate of 275 gpm.

In 1915, after pumping at a rate of 160 gpm, the drawdown was 94 ft from a nonpumping water level of 6 ft.

On September 28, 1922, the well reportedly produced 140 gpm for 4.2 hr with a drawdown of 159.0 ft from a nonpumping water level of 11.0 ft. Thirty-five min after pumping was stopped, the water level had recovered to 17.5 ft.

In 1924, the nonpumping water level was reported to be 40 ft.

A mineral analysis of a sample (Lab. No. 48280) collected in September 1922, showed the water to have a hardness of 639 mg/l, total dissolved minerals of 1458 mg/l, and an iron content of 0.0 mg/l.

WELL NO. 2, open to the Cambrian-Ordovician aquifer, was constructed in April 1927 to a depth of 1475 ft (measured in 1928 at 1428.8 ft deep) and deepened in January 1944 to a reported depth of 1555 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located about 180 ft south of Ninth St. and 165 ft west of State St., approximately 2420 ft N and 1650 ft E of the SW corner of Section 23, T36N, R10E. The land surface elevation at the well is approximately 589 ft.

A sample study log of Well No. 2 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Glacial drift	7	7
<b>SILURIAN SYSTEM</b>		
Niagaran Series		
Racine-Joliet Dolomite	123	130
Alexandrian Series		
Kankakee Dolomite	40	170
Elwood Dolomite	45	215
Wilhelmi Formation		
Dolomite, silty and argillaceous	35	250
"Shale"	24	274
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone	27	301
Scales Shale	69	370
Galena Group	170	540
Platteville Group	100	640
Ancell Group		
Glenwood Formation	12	652
St. Peter Sandstone		
Sandstone, water bearing	193	845
Sandstone, shale and chert	60	905
Prairie du Chien Group		
Oneota Dolomite	85	990
<b>CAMBRIAN SYSTEM</b>		
Eminence Dolomite	70	1060
Potosi Dolomite	140	1200
Franconia Formation		
Sandstone and dolomite	105	1305
Iron-ton-Galesville Sandstone		
Sandstone water bearing	123	1428

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
"Settled hard sand"	47	1475
Interval not studied	80	1555

Originally, a 25-in. diameter hole was drilled to a depth of 9 ft, reduced to 19 in. between 9 and 364.8 ft, reduced to 15.2 in. between 364.8 and 406.2 ft, reduced to 12 in. between 406.2 and 913.4 ft, and finished 10 in. in diameter from 913.4 to 1475 ft. Originally, the well was cased with 24-in. OD pipe from land surface to a depth of 9 ft, 16-in. OD pipe from land surface to a depth of 364.8 ft, 12-in. pipe from 351.3 ft to a depth of 406.2 ft (cemented in), and 10-in. liner pipe from 843 ft to a depth of 913.4 ft. In 1944, the 10-in. hole was deepened from 1475, to 1555 ft, a 2.7-ft length of 16-in. pipe was welded to the top of the 16-in. pipe, and the 10-in. liner pipe was replaced. The 24-in. pipe was removed from above the pump pit. In 1968, during rehabilitation, the hole was reamed out to 20 in. in diameter to a depth of 442 ft, 15.2 in. from 442 to 910 ft, and 12 in. from 910 to 1555 ft. The well was then cased with 16-in. OD pipe from land surface to a depth of 431 ft (cemented in) and 12-in. pipe from 826.4 ft to a depth of 910 ft.

On May 14, 1928, the well reportedly produced 330 gpm for 24 hr with a drawdown of 70 ft from a nonpumping water level of 220 ft.

On June 28, 1928, after an idle period of 43 days, the nonpumping water level was reported to be 205.4 ft below the pumphouse floor.

In 1935, the well reportedly produced 375 gpm with a drawdown of 90 ft from a nonpumping water level of 207 ft.

In 1939, the nonpumping water level was reported to be 220 ft below the pumphouse floor.

By July 1943, the production of the well had dropped to 180 gpm. An electric log of the well was made by the State Geological Survey on November 24 and 26, 1943. The depth of the well was found to be 1453 ft and the nonpumping water level was 285 ft.

In 1944, this well was cleaned out to its original depth and deepened by the J. P. Miller Artesian Well Co. A production test conducted on February 7, 1944, indicated that the well had a very low yield. In March 1944, the well was shot with 5 charges (1000 lb) of nitroglycerin placed 8 ft apart with the first shot at the lower level of 1458 ft. After casing repair work in May 1944, a production test was conducted on July 15-16, 1944, by representatives of the driller, the city, and the State Water Survey. After 21.5 hr of pumping at rates of 250 to 455 gpm, the drawdown was 73 ft from a nonpumping water level of 316 ft below the top of the casing. Fifteen min after pumping was stopped, the water level had recovered to 333 ft.

Nonpumping water levels were reported to be 317 ft below the pump base on September 15, 1944, after a 1-week

idle period, and 356 ft on October 13, 1946, after a 45-min idle period.

On June 28, 1955, the well was shot with 413 lb of 100 percent nitrogel and 9 lb of 60 percent primer from 1538 to 1548 ft.

Nonpumping water levels were reported to be 421.6 ft on August 22, 1955, and 422 ft below the pump base in February 1956.

In March 1956, the well reportedly produced 540 gpm for 8 min with a drawdown of 64 ft from a nonpumping water level of 412 ft.

In 1968, this well was reamed out and new casing installed by the J. P. Miller Artesian Well Co. On May 24, 1968, after 24 hr of pumping at a rate of 1000 gpm, the drawdown was 175 ft from a nonpumping water level of 545 ft below land surface.

A production test was conducted by the J. P. Miller Artesian Well Co. on November 25, 1975. After 8.4 hr of pumping at rates of 890 to 880 gpm, the drawdown was 131 ft from a nonpumping water level of 630 ft. The well was then chlorinated and on November 28, 1975, the well reportedly produced from 895 to 890 gpm for 6.5 hr with a drawdown of 131 ft. Thirty min after pumping was stopped, the water level had recovered to 661 ft.

The pumping equipment presently installed consists of a 250-hp 1770 rpm General Electric motor, a 12-in., 17-stage Peerless turbine pump set at 880 ft, rated at 1000 gpm, and has 880 ft of 10-in. column pipe. The well is equipped with 880 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B41241) of a sample collected April 4, 1978, after pumping for 16 hr at 825 gpm, showed the water to have a hardness of 243 mg/l, total dissolved minerals of 517 mg/l, and an iron content of 0.2 mg/l.

WELL NO. 3, open to the Cambrian-Ordovician aquifer, was completed in July 1940 to a depth of 1571 ft (reported in 1962 at 1544 ft deep) by the S. B. Geiger & Co., Chicago. This well is available for emergency use. The well is located near the intersection of 14th and Division Sts., approximately 100 ft N and 2490 ft E of the SW corner of Section 23, T36N, R10E. The land surface elevation at the well is approximately 662 ft.

A sample study log of Well No. 3 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
QUATERNARY SYSTEM		
Pleistocene Series		
Soil and till	60	60
SILURIAN SYSTEM		
Niagaran Series	135	195
Alexandrian Series		
Kankakee Dolomite	40	235
Elwood Dolomite	15	250

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>SILURIAN AND ORDOVICIAN SYSTEMS</b>		
"Shale and lime shells"	75	325
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone	10	335
Scales Shale	80	415
Galena Group	217	632
Platteville Group	98	730
Ancell Group		
Glenwood Formation		
Sandstone, dolomitic	7	737
St. Peter Sandstone		
Sandstone, incoherent	313	1050
Sandstone, partly compact	112	1162
Shale, chert, some sandstone	133	1295
<b>CAMBRIAN SYSTEM</b>		
Franconia Formation		
Sandstone, dolomitic and shaly	80	1375
Iron-ton-Galesville Sandstone		
Sandstone, partly dolomitic	194	1569
Eau Claire Formation		
Dolomite	2	1571

A 16-in. diameter hole was drilled to a depth of 442 ft, reduced to 12 in. between 442 and 1284 ft, reduced to 10 in. between 1284 and 1364 ft, and finished 8 in. in diameter from 1364 to 1571 ft. The well is cased with 14-in. OD drive pipe from about 1.2 ft above the pump station floor to a depth of 442 ft, 10-in. liner pipe from 1111 ft to a depth of 1290 ft, and 8-in. liner pipe from 1284 ft to a depth of 1364 ft. In 1956, the J. P. Miller Artesian Well Co., Brookfield, reamed out the well to 17 in. in diameter to a depth of 443 ft, installed an 18-in. pipe from land surface to a depth of 60 ft, and replaced the 14-in. casing from land surface to a depth of 442 ft (cemented in).

Upon completion, after pumping at a rate of 340 gpm, the drawdown was 127 ft from a nonpumping water level of 322 ft below the pump base. Pumping was continued at a rate of 450 gpm with a drawdown of 177 ft.

In September 1946, the average nonpumping water level was reported to be 430 ft.

In April 1953, the well reportedly produced 325 gpm for 13 min with a drawdown of more than 89 ft from a nonpumping water level of 453 ft.

In September 1954, after 2 hr of pumping at a rate of 325 gpm, the drawdown was 57 ft from a nonpumping water level of 490 ft below the pump base.

In August 1956, this well was rehabilitated by the J. P. Miller Artesian Well Co. The hole was reamed out to a depth of 443 ft, an 18-in. pipe installed, and the old 14-in. pipe was removed and replaced. The well was then shot (7 oz of glycerin per shot) by the Dowell Co. as follows: 2 shots per ft at intervals between 1560 and 1517 ft and 1 shot per ft at intervals between 1516 and 1480 ft. After shooting, the nonpumping water level was reported to be 493 ft.

In October 1969, the well reportedly produced 320 gpm

with a drawdown of 62 ft from a nonpumping water level of 640 ft.

The pumping equipment presently installed is a 21-stage Peerless turbine pump set at 730 ft, and powered by an electric motor.

A partial analysis of a sample (Lab. No. 169204) collected June 20, 1966, after pumping for several hours, showed the water to have a hardness of 232 mg/l, total dissolved minerals of 468 mg/l, and an iron content of 0.6 mg/l.

WELL NO. 4, open to the Cambrian-Ordovician aquifer, was completed in November 1954 to a depth of 1572 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located at the northeast corner of Madison and Fifth Sts. at 428 South Madison St., approximately 1887 ft S and 1054 ft W of the NE corner of Section 23, T36N, R10E. The land surface elevation at the well is approximately 650 ft.

A sample study log of Well No. 4 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
"Drift" — no samples	48	48
<b>SILURIAN SYSTEM</b>		
Niagaran Series		
Dolomite, cherty, white to buff, very fine	17	65
Dolomite, silty, white to pink, extra fine	30	95
Dolomite, white to buff, very fine, porous	20	115
Dolomite, silty, buff, extra fine	20	135
Dolomite, silty, green, buff, extra fine	10	145
Alexandrian Series		
Kankakee Dolomite		
Dolomite, white to gray, extra fine	40	185
Elwood Dolomite		
Dolomite, cherty, sandy, buff to gray	40	225
Wilhelmi Formation		
Dolomite, cherty, silty, gray to buff	20	245
Dolomite, silty, gray to buff, speckled	20	265
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Ft. Atkinson Limestone		
Dolomite, silty, sandy, gray to buff	10	275
Limestone, buff, gray; shale, white to gray	20	295
Dolomite, gray, fine to medium, porous	5	300
Scales Shale		
Shale, silty, calcareous, gray, green	81	381
Galena Group		
Dolomite, buff to gray, pyritic	14	395
Limestone, buff to gray, speckled black	50	445
Limestone, buff to gray, fine to medium	85	530
Limestone, buff gray, speckled red and black	35	565

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Platteville Group		
Limestone, buff to gray, cherty, silty	45	610
Dolomite, gray to buff; shale at top	35	645
Limestone, gray to buff, extra fine	25	670
Dolomite, silty, buff to gray, fine	25	695
Limestone, gray to buff; dolomite, buff	22	717
Ancell Group		
Glenwood Formation		
Sandstone, white, fine, very coarse	38	755
St. Peter Sandstone		
Sandstone, white, gray, frosted	165	920
Sandstone silty calcareous, white	60	980
Sandstone, white, frosted	35	1015
Dolomite, silty, sandy, white, buff, pink	30	1045
No sample	5	1050
Kress Member		
Shale, oolitic chert, red, green, white	45	1095
Sandstone, cherty, white to gray, coarse	10	1105
Shale, cherty; dolomite, oolitic chert	20	1125
Sandstone, white to gray, fine to coarse	35	1160
CAMBRIAN SYSTEM		
Eminence Dolomite		
Dolomite, sandy, silty, white to buff	37	1197
Potosi Dolomite		
Dolomite, buff, white, pink, glauconitic	58	1255
Franconia Formation		
Dolomite, glauconitic, sandy, gray buff	10	1265
Sandstone, glauconitic, greenish gray, buff	75	1340
Ironton Sandstone		
Dolomite, silty, glauconitic, buff	20	1360
Sandstone, white, pink, gray, fine, coarse	65	1425
Galesville Sandstone		
Sandstone, white, buff, gray, red, silty	70	1495
Dolomite, very sandy, buff, fine to medium	10	1505
Sandstone, white to buff, fine to coarse	48	1553
Eau Claire Formation		
Dolomite, brown to grayish brown	7	1560

A 24-in. diameter hole was drilled to a depth of 500 ft, reduced to 17.2 in. between 500 and 1150 ft, and finished 13.2 in. in diameter from 1150 to 1572 ft. The well is cased with 24-in. OD pipe from land surface to a depth of 50 ft, 18-in. OD pipe from land surface to a depth of 500 ft (cemented in), and 14-in. OD liner pipe from 990 ft to a depth of 1150 ft.

After the well was shot between the depths of 1464 and 1534 ft, a production test was conducted by the driller on November 9-10, 1954. After 24.5 hr of pumping at rates ranging from 770 to 680 gpm, the final drawdown was 87 ft from a nonpumping water level of 455 ft below land sur-

face. Five min after pumping was stopped, the water level had recovered to 489 ft.

In August 1956, the well reportedly produced 1125 gpm for 1.1 hr with a drawdown of 87 ft from a nonpumping water level of 484 ft below the pump base.

Nonpumping water levels were reported to be 575 ft below the pump base on September 18, 1962, and 640 ft in 1966.

In October 1969, after pumping at a rate of 900 gpm, the drawdown was 95 ft from a nonpumping water level of 625 ft.

On March 11, 1971, the nonpumping water level was reported to be 640 ft.

In 1971, this well was rehabilitated by the J. P. Miller Artesian Well Co. and the production capacity was reportedly increased from 750 to 1200 gpm after this work.

The pumping equipment presently installed consists of a 400-hp 1769 rpm Ideal electric motor, a 14-in., 10-stage Peerless turbine pump (No. 110077) set at 750 ft, rated at 985 gpm, and has 750 ft of 10-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B15875) is for a water sample from the well collected October 2, 1978, after 24 hr of pumping at 700 gpm.

#### WELL NO. 4, LABORATORY NO. B15875

		<i>mg/l</i>	<i>me/l</i>			<i>mg/l</i>	<i>me/l</i>
Iron	Fe	0.19		Silica	SiO <sub>2</sub>	7.9	
Manganese	Mn	0.01		Fluoride	F	1.5	0.08
Ammonium	NH <sub>4</sub>	0.9	0.05	Boron	B	0.7	
Sodium	Na	70	3.04	Cyanide	CN	0.00	
Potassium	K	14.1	0.36	Nitrate	NO <sub>3</sub>	0.0	0.00
Calcium	Ca	60	2.99	Chloride	Cl	29	0.82
Magnesium	Mg	19	1.56	Sulfate	SO <sub>4</sub>	84	1.75
				Alkalinity (as CaCO <sub>3</sub> )		274	5.48
Arsenic	As	<0.001		Hardness (as CaCO <sub>3</sub> )		233	4.66
Barium	Ba	0.1					
Cadmium	Cd	0.00		Total dissolved minerals		443	
Chromium	Cr	0.01					
Copper	Cu	0.04					
Lead	Pb	0.005					
Mercury	Hg	<0.00002					
Nickel	Ni	0.0					
Selenium	Se	<0.001					
Silver	Ag	0.00					
Zinc	Zn	0.03		pH (as rec'd)		7.6	

WELL NO. 5, open to the Silurian dolomite, was completed in January 1973 to a depth of 330 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located north of Division St. east of Farrell Road, approximately 1395 ft N and 1195 ft E of the SW corner of Section 19, T36N, R11E. The land surface elevation at the well is approximately 712 ft.

A drillers log of Well No. 5 follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Drift	62	62
Lime	13	75
Lime with shale	65	140

Schorie, Joliet. The well is located about 75 ft southwest of Park Road and 147th Place, approximately 2700 ft N and 1375 ft E of the SW corner of Section 7, T36N, R11E. The land surface elevation at the well is approximately 730 ft.

A 6-in. diameter hole was drilled to a depth of 297 ft. The well is cased with 6-in. pipe from 1.5 ft above land surface to a depth of 130 ft. The top of the well casing is equipped with a pitless adapter.

The pumping equipment presently installed is a Red Jacket submersible pump set at 220 ft, rated at 70 gpm, and powered by a 10-hp Red Jacket electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B42552) is for a water sample from the well collected April 19, 1977.

#### WELL NO. 3, LABORATORY NO. B42552

		mg/l	me/l			mg/l	me/l
Iron	Fe	1.2		Silica	SiO <sub>2</sub>	15	
Manganese	Mn	0.05		Fluoride	F	0.2	0.01
Ammonium	NH <sub>4</sub>	0.06	0.00	Boron	B	0.3	
Sodium	Na	22	0.96	Cyanide	CN	0.00	
Potassium	K	5.0	0.13	Nitrate	NO <sub>3</sub>	0.0	0.00
Calcium	Ca	220	10.98	Chloride	Cl	7.5	0.21
Magnesium	Mg	100	8.23	Sulfate	SO <sub>4</sub>	540	11.23
				Alkalinity(asCaCO <sub>3</sub> )		465	9.30
Arsenic	As	0.00		Hardness(asCaCO <sub>3</sub> )		1000	20.00
Barium	Ba	0.0					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		1280	
Copper	Cu	0.06					
Lead	Pb	0.00					
Mercury	Hg	0.0000					
Nickel	Ni	0.0					
Selenium	Se	0.00					
Silver	Ag	0.00					
Zinc	Zn	0.5		pH (as rec'd)		7.5	

## LOCKPORT TOWNSHIP WATER SYSTEM

Lockport Township Water System (est. 2800), located between Lockport and Joliet, installed, a public water supply in 1976. Finished water for this supply is obtained from Lockport for the north area and from Joliet for the south area. In 1978 there were 300 services, all metered, in the north area, and 500 services, all metered, in the south area; the estimated average consumption was 230,000 gpd.

## MANHATTAN

The village of Manhattan (1530) installed a public water supply in 1900. Three wells (Nos. 2, 3, and 4) are in use. In 1953 there were 250 services, none metered; the estimated average pumpage was 50,000 gpd. In 1980 there were 579 services, all metered; the average pumpage was 154,432 gpd. The water is chlorinated, fluoridated, and treated with poly-phosphate to keep iron in solution.

WELL NO. 1, open to the Silurian dolomite, was completed in 1892 to a depth of 105 ft (measured in 1923 to be 98 ft deep). This well was abandoned in 1955 and sealed in 1970. The well was located about 240 ft southeast of First St. and 40 ft southwest of McClure Ave., approximately 1230 ft S and 1300 ft W of the NE corner of Section 20, T34N, R11E. The land surface elevation at the well is approximately 685 ft.

The well was cased with 6-in. pipe from the top of the pump station floor to a depth of about 30 ft.

In October 1923, the nonpumping water level was reported to be 20 ft below land surface.

In June 1949, while the pump was out of the well, the

nonpumping water level was reported to be 40 ft. The pump had been delivering at a rate of 32 gpm and broke suction after 3 min of pumping.

A partial analysis of a sample (Lab. No. 94226) collected October 1, 1942, after pumping for 1 hr at 50 gpm, showed the water to have a hardness of 424 mg/l, total dissolved minerals of 518 mg/l, and an iron content of 0.3 mg/l.

WELL NO. 2, open to the Silurian dolomite, was completed in March 1939 to a depth of 156 ft by Dreher & Schorie, Joliet. The well is located on McClure St. between First and Gustafson Sts. by the elevated tank, approximately 1120 ft S and 1200 ft W of the NE corner of Section 20, T34N, R11E. The land surface elevation at the well is approximately 685 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	35	35
Limestone	121	156

WELL NO. 2, open to the Silurian dolomite, was completed about 1970 to a depth of about 370 ft. This well is available for emergency use. The well is located about 100 ft west of Harlem Ave. and 0.2 mile south of the Penn Central RR, approximately 900 ft S and 100 ft W of the NE corner of Section 25, T35N, R12E, Will County. The land surface elevation at the well is approximately 700 ft.

The well is cased with 10-in. pipe from about 1.2 ft above the wellhouse floor to an unknown depth.

The pumping equipment presently installed is a submersible pump rated at 175 gpm, and powered by a 20-hp electric motor.

WELL NO. 3, open to the Silurian dolomite, was constructed in May 1981 to a depth of 435 ft and deepened in June 1981 to a reported depth of 500 ft by the Henry Boysen Co., Libertyville. This well is not yet in use. The well is located approximately 2460 ft N and 1105 ft W of

the SE corner of Section 30, T35N, R13E, Cook County. The land surface elevation at the well is approximately 725 ft.

A drillers log of Well No. 3 follows:

Strata	Thickness (ft)	Depth (ft)
Drift grade	57	57
Limestone	357	414
Shale	56	470
Limestone	20	490
Shale	10	500

The well is cased with 12-in. pipe to a depth of 61 ft. The pumping equipment is not yet installed.

A partial analysis of a sample (Lab. No. 215682) collected June 5, 1981, showed the water to have a hardness of 554 mg/l, total dissolved minerals of 693 mg/l, and an iron content of 0.1 mg/l.

## RIDGEWOOD SUBDIVISION

Ridgewood Subdivision (est. 315), located just east of Joliet, installed a public water supply in 1927. The water system is owned and operated by the Ridgewood Water Association. One well is in use. In 1956 there were 80 services, plus 1 school, none metered; the estimated average pumpage was 10,000 to 15,000 gpd. In 1980 there were 90 services, none metered; the estimated average pumpage was 45,000 gpd. The water is chlorinated and fluoridated.

WELL NO. 1, open to the Silurian dolomite, was constructed in April 1927 to a depth of 277 ft by Mr. Bersey, and deepened in June 1930 to a reported depth of 375 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located about 150 ft east of 1114 Ridgewood St., approximately 2300 ft S and 2800 ft W of the NE corner of Section 11, T35N, R10E. The land surface elevation at the well is approximately 640 ft.

An 8-in. diameter hole was drilled to a depth of 92 ft and finished 6 in. in diameter from 92 to 375 ft. The well is cased with 8-in. pipe from about 0.7 ft above the floor of a 5-ft deep pit to a depth of 35 ft and 6-in. pipe from about 0.8 ft above the floor of a 5-ft deep pit to a depth of 92 ft.

On April 20, 1936, when pumping at capacity, the draw-down was 15 ft from a nonpumping water level of 128 ft below the pump base:

The pumping equipment presently installed consists of a 10-hp U. S. electric motor, a 6-in., 22-stage Peerless turbine pump (No. 6440) set at 150 ft, rated at 80 gpm at about 276 ft TDH, and has 150 ft of 4-in. column pipe.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. 04721) is for a water sample from the well collected March 27, 1971.

WELL NO. 1, LABORATORY NO. 04721									
		mg/l	me/l			mg/l	me/l		
Iron	Fe	0.0	0.00	Silica	SiO <sub>2</sub>	12			
Manganese	Mn	0.0	0.00	Fluoride	F	0.2	0.01		
Ammonium	NH <sub>4</sub>	0.0	0.00	Boron	B	0.4			
Sodium	Na	20.5	0.89	Nitrate	NO <sub>3</sub>	4.8	0.08		
Potassium	K	4.3	0.11	Chloride	Cl	29	0.82		
Calcium	Ca	158	7.88	Sulfate	SO <sub>4</sub>	431	8.96		
Magnesium	Mg	100	8.22	Alkalinity (as CaCO <sub>3</sub> )		352	7.04		
				Hardness (as CaCO <sub>3</sub> )		800			
Barium	Ba	0.0		Total dissolved minerals		918			
Cadmium	Cd	0.00		pH (as rec'd)		6.9			
Chromium	Cr	0.0		Radioactivity					
Copper	Cu	0.0		Alpha pc/l		0			
Lead	Pb	0.00		± deviation		2			
Mercury	Hg	<0.0005		Beta pc/l		2			
Nickel	Ni	0.0		± deviation		3			
Silver	Ag	0.0							
Zinc	Zn	0.05							

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Black top soil	2	2
Gravel and clay	3	5
Sand and gravel	8	13
Limestone	42	55
Blue clay	17	72
Limestone	230	302

An 8-in. diameter hole was drilled to a depth of 72 ft and finished 6 in. in diameter from 72 to 302 ft. The well is cased with 8-in. pipe from about 1.5 ft above the pump-house floor to a depth of 32 ft and 6-in. liner pipe from 52 ft to a depth of 72 ft.

On January 11, 1963, the nonpumping water level was reported to be 30 ft.

The pumping equipment presently installed is a Sta-Rite submersible pump set at 110 ft, rated at 50 gpm, and powered by a 5-hp Sta-Rite electric motor.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B29592) is for a

water sample from the well collected January 26, 1976, after 30 min of pumping at 60 gpm.

#### WELL NO. 1, LABORATORY NO. B29592

		mg/l	me/l			mg/l	me/l
Iron	Fe	0.7		Silica	SiO <sub>2</sub>	10	
Manganese	Mn	0.00		Fluoride	F	0.4	0.02
Ammonium	NH <sub>4</sub>	0.21	0.01	Boron	B	0.5	
Sodium	Na	67	2.91	Cyanide	CN	0.00	
Potassium	K	4.6	0.12	Nitrate	NO <sub>3</sub>	1.32	0.02
Calcium	Ca	93	4.64	Chloride	Cl	130	3.67
Magnesium	Mg	52	4.28	Sulfate	SO <sub>4</sub>	93	1.93
				Alkalinity (as CaCO <sub>3</sub> )		314	6.28
Arsenic	As	0.00		Hardness (as CaCO <sub>3</sub> )		446	8.92
Barium	Ba	0.1					
Cadmium	Cd	0.00		Total dissolved			
Chromium	Cr	0.00		minerals		689	
Copper	Cu	0.05					
Lead	Pb	0.00		pH (as rec'd)		8.0	
Mercury	Hg	0.0000		Radioactivity			
Nickel	Ni	0.0		Alpha pc/l		3.9	
Selenium	Se	0.00		± deviation		2.8	
Silver	Ag	0.00		Beta pc/l		8.7	
Zinc	Zn	0.0		± deviation		2.9	

## STATEVILLE CORRECTIONAL CENTER

Stateville Correctional Center (est. 2950), located about 1 mile north of Joliet on the west side of the Des Plaines River, installed a public water supply in 1920. Four wells (Nos. 3, 4, 5, and 6) are in use. In 1952 the estimated average and maximum pumpages were 650,000 and 1,000,000 gpd, respectively. In 1980 the average pumpage was 868,065 gpd. The water is chlorinated.

WELL NO. 1 (Center Well), open to the Cambrian-Ordovician aquifer, was constructed in 1913 to a depth of 1095 ft by W. H. Gray & Co., and deepened in February 1941 to a reported depth of 1599 ft by the J. P. Miller Artesian Well Co., Brookfield. This well has not been used since 1965. The well is located within the prison walls about 300 ft east of the center of the west wall, approximately 965 ft S and 1565 ft E of the NW corner of Section 28, T36N, R10E. The land surface elevation at the well is approximately 646 ft.

A correlated and sample study log of Well No. 1 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
QUATERNARY SYSTEM		
Pleistocene Series		
Glacial drift	65	65
SILURIAN SYSTEM		
Niagaran and Alexandrian Series		
Dolomites, water bearing	315	380

Strata (continued)	Thickness (ft)	Depth (ft)
ORDOVICIAN SYSTEM		
Maquoketa Group		
Shale and dolomite	110	490
Galena and Platteville Groups		
Dolomite	340	830
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	124	954
Shale, caving	10	964
ORDOVICIAN AND CAMBRIAN SYSTEMS		
Oneota-Eminence Dolomite		
Dolomite and sandy dolomite	131	1095
CAMBRIAN SYSTEM		
Potosi Dolomite	180	1275
Franconia Formation		
Dolomite and sandstone	118	1393
Ironton-Galesville Sandstone	157	1550
Eau Claire Formation		
Dolomite and shale	50	1600

The original hole and casing records are unknown. About 1930, a screen was placed at the base of the glacial drift by Joseph A. Mesiroff, Milwaukee, Wis. This was installed and gravel packed by the use of small pilot holes in order to admit water from the glacial drift. During deepening in 1941, the screen and old casing were removed and the Ironton-Galesville Sandstone was shot with three charges as follows: 150 lb at 1552 ft, 105 lb at 1537 ft, and 150 lb at 1520 ft. The well was then cased with 10-in. pipe from land surface to a depth of 426 ft and 8-in. pipe from 1060 ft to a depth of 1102 ft.

In 1923, the nonpumping water level was reported to be 40 ft below land surface.

A production test was conducted by the State Water Survey on February 19, 1941. After 4.4 hr of pumping at rates of 267 to 215 gpm, the final drawdown was 42.0 ft from a nonpumping water level of 290.0 ft. Fifteen min after pumping was stopped, the water level had recovered to 301.5 ft.

In January 1947 and in May 1948, the nonpumping water level was reported to be 451 ft.

The pumping equipment presently installed consists of a 60-hp 1750 rpm General Electric motor (Serial No. 4B6519396), an 8-in., 21-stage Pomona turbine pump (No. SW 1775) set at 570 ft, rated at 350 gpm, and has 570 ft of 5-in. column pipe. A 30-ft section of 5-in. suction pipe is attached to the pump intake.

A partial analysis of a sample (Lab. No. 106175) collected April 13, 1946, after pumping for several days, showed the water to have a hardness of 398 mg/l, total dissolved minerals of 518 mg/l, and an iron content of 0.4 mg/l.

WELL NO. 2 (South Well), open to the Cambrian-Ordovician aquifer, was completed in January 1921 to a depth of 1577 ft (reported to be 1553 ft deep in 1947) by the J. P. Miller Artesian Well Co., Brookfield. This well has not been used since July 1966. The well is located in the southwest corner of the prison yard about 300 ft from the west and south walls, approximately 1500 ft S and 1565 ft E of the NW corner of Section 28, T36N, R10E. The land surface elevation at the well is approximately 643 ft.

A correlated drillers log of Well No. 2 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Glacial drift	49	49
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomites, water bearing	206	255
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Shale and dolomite	110	365
Galena and Platteville Groups		
Dolomite	335	700
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	130	830
Shale, sandy near middle	45	875
Prairie du Chien Group		
Oneota Dolomite	180	1055
<b>CAMBRIAN SYSTEM</b>		
Eminence-Potosi Dolomite		
Dolomite, partly sandy	245	1300
Franconia Formation		
Dolomite and shale	130	1430
Ironton-Galesville Sandstone		
Sandstone, part dolomitic	126	1556
Eau Claire Formation		
Dolomite	21	1577

A 16-in. diameter hole was drilled to a depth of 178.5 ft, reduced to 12 in. between 178.5 and 370 ft, reduced to 10 in. between 370 and 933 ft, and finished 8 in. in diameter from 933 to 1577 ft. The well is cased with 16-in. OD drive pipe from land surface to a depth of 70 ft, 12-in. pipe from land surface to a depth of 178.5 ft, 10-in. liner pipe from 232 ft to a depth of 370 ft, and an 8-in. liner pipe from 883 ft to a depth of 933 ft. In 1947, a 10-in. pipe was installed from land surface to a depth of 415.9 ft (cemented in) in addition to the original 16-in. casing and 8-in. liner.

Nonpumping water levels were reported to be 55 ft in 1921, 81.7 ft in September 1941, 88 ft in October 1941, 70 ft in November 1941, and 62 ft on January 13, 1942.

In May 1947, this well was shot with 200 lb of nitrogel and 18 sticks of dynamite between the depths of 1528 and 1548 ft by the J. P. Miller Artesian Well Co. The nonpumping water level was lowered considerably for 2 or 3 days after shooting and then rose to 164 ft below land surface. On May 15, 1947, the nonpumping water level was reported to be 80 ft. The well was shot again by the J. P. Miller Artesian Well Co. in June 1947 with 250 lb of gel between the depths of 1506 and 1526 ft. An estimated amount of 18 to 20 truck loads of sand was removed. A new 10-in. casing was then installed and three weeks after the second shooting, the nonpumping water level was reported to be 433 to 436 ft and the well was reported to be 1553 ft deep.

On September 18, 1947, the well reportedly produced 260 gpm with a drawdown of 30 ft from a nonpumping water level of 445 ft.

In March 1949, the nonpumping water level was reported to be 454 to 456 ft.

The pumping equipment presently installed is a Peerless turbine pump (Serial No. 05620) set at 605 ft, rated at 400 gpm, and powered by a 125-hp 1800 rpm U. S. electric motor (Serial No. 908042).

A partial analysis of a sample (Lab. No. 105923) collected March 23, 1946, after pumping for several days, showed the water to have a hardness of 606 mg/l, total dissolved minerals of 658 mg/l, and an iron content of 1.1 mg/l.

WELL NO. 3 (North Well), open to the Cambrian-Ordovician aquifer, was completed in September 1926 to a depth of 1527 ft by the Gray Well Drilling Co., Milwaukee, Wis. The well is located near the northwest corner of the prison yard about 300 ft east of the west wall and 450 ft south of the north wall, approximately 445 ft S and 1565 ft E of the NW corner of Section 28, T36N, R10E. The land surface elevation at the well is approximately 643 ft.

A sample study log of Well No. 3 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>QUATERNARY SYSTEM</b>		
Pleistocene Series		
Glacial drift	60	60



<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomite, white, water bearing	120	180
Alexandrian Series		
Elwood Dolomite		
Dolomite, white chert	40	220
Wilhelmi Formation		
Dolomite gray	30	250
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Brainard Shale	15	265
Ft. Atkinson Limestone		
Dolomite, shaly	25	290
Scales Shale	75	365
Galena Group		
Dolomite	225	590
Platteville Group		
Dolomite	100	690
Ancell Group		
Glenwood Formation		
Sandstone, dolomitic	10	700
St. Peter Sandstone		
Sandstone, water bearing	130	830
Sandy shale and chert, caving	45	875
Prairie du Chien Group		
Oneota Dolomite	155	1030
<b>CAMBRIAN SYSTEM</b>		
Eminence Dolomite		
Dolomite, sandy	70	1100
Potosi Dolomite	160	1260
Franconia Formation		
Sandstone and shale	120	1380
Iron-ton Sandstone		
Sandstone, fine to coarse, dolomitic	60	1440
Galesville Sandstone		
Sandstone, water bearing	87	1527

Originally, a 15-in. diameter hole was drilled to a depth of 305 ft, reduced to 12 in. between 305 and 400 ft, reduced to 10 in. between 400 and 1400 ft, and finished 8 in. in diameter from 1400 to 1527 ft. The well was reported to be cased with 16-in. OD drive pipe from land surface to a depth of 73 ft, 10-in. pipe from 260 ft to a depth of 400 ft, and 8-in. pipe from 776 ft to a depth of 1400 ft. After drilling, the well was shot in the Iron-ton-Galesville Sandstone. After rehabilitation in 1942, the hole was reported to be 15 in. in diameter to a depth of 305 ft, 12 in. from 305 to 402 ft, 10-in. from 402 to 884 ft, and 8 in. from 884 to 1527 ft. The casing was reported to be 16-in. pipe from land surface to a depth of 73 ft, 12-in. pipe from land surface to a depth of 305 ft, 10-in. pipe from 282 ft to a depth of 402 ft, and an 8-in. liner from 789 ft to a depth of 884 ft.

In 1941, the nonpumping water level was reported to be 312.8 ft below land surface.

In March 1942, during rehabilitation, this well was shot by the J. P. Miller Artesian Well Co., Brookfield, with three 150-lb charges at depths of 1515, 1497, and 1475 ft. A total of slightly less than 5 cubic yards of sand was removed, the greatest amount of which was loosened after the first shot at 1515 ft.

A production test was conducted by the State Water Survey on April 7, 1942. After 8.2 hr of pumping at rates of 134 to 308 gpm, the final drawdown was 64.5 ft from a nonpumping water level of 327.0 ft below land surface. Fifteen min after pumping was stopped, the water level had recovered to 344.0 ft. During this test, Well No. 1 was pumping continuously.

On April 20, 1944, the nonpumping water level was reported to be 367 ft below land surface after an idle period of 3 days.

On March 11, 1949, the nonpumping water level was reported to be 439 ft.

On March 6, 1972, the J. P. Miller Artesian Well Co. reported that the well produced 230 gpm with a drawdown of 82 ft from a nonpumping water level of 610 ft.

The pumping equipment presently installed consists of a 150-hp U. S. electric motor, a Peerless turbine pump set at 840 ft, operated at 160 gpm, and has 840 ft of 6-in. column pipe.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B41266) of a sample collected in April 1977, showed the water to have a hardness of 209 mg/l, total dissolved minerals of 411 mg/l, and an iron content of 0.1 mg/l.

WELL NO. 4 (Outside Well), open to the Cambrian-Ordovician aquifer, was completed in 1937 to a depth of 2007 ft (filled to 1566 ft in 1948 and reported to be 1537 ft deep in May 1975) by the W. L. Thorne Co., Des Plaines. The well is located about 50 ft outside the south wall near the southwest corner of the prison walls, approximately 1760 ft S and 1565 ft E of the NW corner of Section 28, T36N, R10E. The land surface elevation at the well is approximately 640 ft.

A sample study log of Well No. 4 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
<b>QUATERNARY SYSTEM</b>		
Pleistocene series		
Glacial drift	65	65
<b>SILURIAN SYSTEM</b>		
Niagaran and Alexandrian Series		
Dolomites, water bearing	180	245
<b>ORDOVICIAN SYSTEM</b>		
Maquoketa Group		
Brainard Shale	15	260
Ft. Atkinson Limestone	20	280
Scales Shale	80	360
Galena and Platteville Groups		
Dolomites	340	700
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, water bearing	127	827
Prairie du Chien Group		
Shakopee Dolomite		
Dolomite, shaly	53	880
Oneota Dolomite	175	1055
<b>CAMBRIAN SYSTEM</b>		
Eminence Dolomite		
Dolomite and sandstone	32	1087

<i>Strata (continued)</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
Potosi Dolomite	173	1260
Franconia Formation		
Shale, dolomite, and sandstone	135	1395
Ironton-Galesville Sandstone	175	1570
Eau Claire Formation		
Dolomite, shale, and sandstone	395	1965
Mt. Simon Sandstone		
Sandstone, water bearing	42	2007

A 20-in. diameter hole was drilled to a depth of 433 ft, reduced to 18 in. between 433 and 896 ft, reduced to 16 in. between 896 and 1431 ft, reduced to 12 in. between 1431 and 1910 ft, and finished 10 in. in diameter from 1910 to 2007 ft. Originally, the well was cased with 12-in. pipe from land surface to a depth of 1432.5 ft and 10-in. pipe from 1590 ft to a depth of 1910 ft. During the rehabilitation work in 1948, the old casing was removed except for the 10-in. liner and new casings were installed consisting of 20-in. pipe from land surface to a depth of 60 ft and 16-in. pipe from land surface to a depth of 433 ft (cemented in). After rehabilitation in 1975, the hole was 21 in. in diameter to a depth of 433 ft, 18 in. from 433 to 896 ft, 16 in. from 896 to 1431 ft, and 12 in. from 1431 to 1537 ft. The well is now cased with 20-in. pipe from land surface to a depth of 60 ft, 16-in. pipe from land surface to a depth of 433 ft (cemented in), and 12-in. liner pipe from 1313 ft to a depth of 1431 ft (cemented in).

A production test was conducted by the State Water Survey on April 27, 1937. After 4.5 hr of pumping at rates ranging from 230 to 250 gpm, the drawdown was more than 304 ft from a nonpumping water level of 70 ft below land surface.

In 1941, the nonpumping water level was reported to be 140 ft.

Between December 1947 and March 1948, this well was shot by the J. P. Miller Artesian Well Co., Brookfield, with three charges (2300 lb of nitrocel) at depths of 1565, 1548, and 1518 ft. There was very little sand from the first two shots but several truck loads from the third shot. The well was cleaned out to 2005 ft, backfilled with gravel and a concrete bridge was placed at 1566 ft, and recased except for the 10-in. liner below 1590 ft.

A short production test was conducted on November 10, 1948, by representatives of the J. P. Miller Artesian Well Co., the State Water Survey, and Illinois State Penitentiary employees. After 1.8 hr of pumping at rates of 700 to 625 gpm, the drawdown was 62 ft from a nonpumping water level of 460 ft.

On November 7, 1952, the well reportedly produced 630 gpm for 3.8 hr with a drawdown of 96.3 ft from a nonpumping water level of 467.7 ft. Thirty min after pumping was stopped, the water level had recovered to 475.0 ft.

A production test was conducted by the J. P. Miller Artesian Well Co. on May 29, 1975. After 5.6 hr of pump-

ing at rates of 690 to 890 gpm, the drawdown was 80 ft from a nonpumping water level of 685 ft below the top of the casing. Thirty-two min after pumping was stopped, the water level had recovered to 708 ft.

The pumping equipment presently installed consists of a 300-hp 1769 rpm Ideal electric motor, an 11.5-in., 13-stage Peerless turbine pump set at 830 ft, rated at 890 gpm at about 846 ft TDH, and has 830 ft of 8-in. column pipe. A 20-ft section of 8-in. suction pipe is attached to the pump intake. The well is equipped with 830 ft of airline.

A partial analysis of a sample (Lab. No. 117549) collected March 11, 1949, when the well was 2007 ft deep, after pumping for 24 hr, showed the water to have a hardness of 248 mg/l, total dissolved minerals of 477 mg/l, and an iron content of 0.2 mg/l.

WELL NO. 5 (Honor Farm Well), open to the Cambrian-Ordovician aquifer, was completed in February 1951 to a depth of 1653 ft by the J. P. Miller Artesian Well Co., Brookfield. The well is located about 0.5 mile west of the prison walls on the Honor Farm in the vicinity of the farm buildings, approximately 1100 ft S and 1250 ft W of the NE corner of Section 29, T36N, R10E. The land surface elevation at the well is approximately 645 ft.

A sample study log of Well No. 5 furnished by the State Geological Survey follows:

<i>Strata</i>	<i>Thickness (ft)</i>	<i>Depth (ft)</i>
QUATERNARY SYSTEM		
Pleistocene Series		
Drift	64	64
SILURIAN SYSTEM		
Niagaran Series	106	170
Alexandrian Series		
Kankakee Dolomite	45	215
Elwood Dolomite	40	255
ORDOVICIAN SYSTEM		
Maquoketa Group		
Brainerd Shale	15	270
Ft. Atkinson Limestone	45	315
Scales Shale	60	375
Galena Group		
Dolomite	225	600
Platteville Group		
Dolomite	117	717
Ancell Group		
Glenwood-St. Peter Sandstone		
Sandstone, some dolomitic and silty	123	840
Shale, dolomitic, sandy	30	870
Prairie du Chien Group		
Shakopee Dolomite	90	960
Oneota Dolomite	165	1125
Gunter Sandstone	19	1144
CAMBRIAN SYSTEM		
Eminence Dolomite	61	1205
Potosi Dolomite	120	1325
Franconia Formation		
Dolomite, shale, and sand	85	1410
Ironton-Galesville Sandstone	176	1586
Eau Claire Formation		
Dolomite and shale	67	1653

A 23-in. diameter hole was drilled to a depth of 450 ft, reduced to 15 in. between 450 and 1350 ft, and finished 12 in. in diameter from 1350 to 1653 ft. The well is cased with 23-in. pipe from land surface to a depth of 64.5 ft and 16-in. pipe from land surface to a depth of 450 ft (cemented in).

Before shooting, a production test was conducted on March 6, 1951, by representatives of the driller, the State Water Survey, and the Division of Architecture and Engineering. After 2.5 hr of intermittent pumping at rates ranging from 265 to 75 gpm, the maximum drawdown was 123 ft from a nonpumping water level of 426 ft.

The well was shot as follows: 750 lb nitrogel and 20 lb of primer between 1572 and 1590 ft, 750 lb of gel and 18 lb of primer between 1547 and 1565 ft, 750 lb of gel and 8 lb of primer between 1535 and 1551 ft, 610 lb of gel and 8 lb of primer between 1521 and 1537 ft, and 400 lb of gel and 9 lb of primer between 1501 and 1515 ft.

After shooting a production test was conducted by the driller on August 21-22, 1951. After 16.9 hr of pumping at rates ranging from 310 to 445 gpm, the maximum drawdown was 73 ft from a nonpumping water level of 452 ft below land surface.

In September 1958, the well reportedly produced 550 gpm for 3 hr with a drawdown of 78 ft from a nonpumping water level of 478 ft below the top of the pump base.

On November 3-5, 1974, the well reportedly produced 680 gpm for 52 hr with a drawdown of 91 ft from a nonpumping water level of 670 ft.

In March 1980, considerable sand was bailed out during pump repairs.

The pumping equipment presently installed consists of a 250-hp 1760 rpm Ideal electric motor, an 11.5-in., 15-stage Peerless turbine pump set at 800 ft, rated at 680 gpm at about 761 ft TDH, and has 800 ft of 8-in. column pipe. A 10-ft section of 8-in. suction pipe is attached to the pump intake. The well is equipped with 800 ft of airline.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B40202) of a sample collected March 28, 1978, after pumping at 700 gpm, showed the water to have a hardness of 186 mg/l, total dissolved minerals of 503 mg/l, and an iron content of 0.2 mg/l.

WELL NO. 6, open to the Cambrian-Ordovician aquifer, was completed in November 1965 to a depth of 1611 ft by the Wehling Well Works, Beecher. The well is located about 600 ft north of the northeast corner of the prison walls, approximately 293 ft N and 1980 ft W of the SE corner of Section 21, T36N, R10E. The land surface elevation at the well is approximately 642 ft.

A sample study summary log of Well No. 6 furnished by the State Geological Survey follows:

Strata	Thickness (ft)	Depth (ft)
QUATERNARY SYSTEM		
Pleistocene Series		
Glacial drift	58	58
SILURIAN SYSTEM		
Niagaran Series		
Dolomites	122	180
Alexandrian Series		
Dolomites	83	263
ORDOVICIAN SYSTEM		
Maquoketa Group		
Brainard Shale	12	275
Ft. Atkinson Limestone		
Dolomite	30	305
Scales Shale	78	383
Galena Group		
Dolomites	192	575
Platteville Group		
Dolomites	145	720
Ancell Group		
Glenwood-St. Peter Sandstone	133	853
Prairie du Chien Group		
Shakopee Dolomite	56	909
Oneota Dolomite	181	1090
CAMBRIAN SYSTEM		
Eminence Dolomite		
Dolomite, sandy; and sandstone	65	1155
Potosi Dolomite		
Dolomite, slightly glauconitic	132	1287
Franconia Formation		
Sandstone and siltstone, dolomitic and glauconitic	113	1400
Ironston Sandstone		
Sandstone, fine to coarse, dolomitic, hard	90	1490
Galesville Sandstone		
Sandstone, mostly medium and incoherent	72	1562
Eau Claire Formation		
Dolomite and shale	49	1611

A 20-in. diameter hole was drilled to a depth of 60 ft, reduced to 19.2 in. between 60 and 450 ft, reduced to 15.2 in. between 450 and 950 ft, and finished 12.2 in. in diameter from 950 to 1611 ft. The well is cased with 20-in. drive pipe from land surface to a depth of 60 ft, 16-in. pipe from land surface to a depth of 446 ft (cemented in), and 13.4-in. pipe from 681 ft to a depth of 950 ft.

On November 20, 1965, this well was shot with 1860 lb of 100 percent solidified nitroglycerin between 1462 and 1569 ft.

A production test was conducted on February 24-25, 1966, by representatives of the driller and Crawford, Murphy & Tilly, Inc., Consulting Engineers. After 7 hr of pumping at rates of 500 to 275 gpm, the drawdown was 112 ft from a nonpumping water level of 573 ft below land surface. After 45 min of recovery, pumping was continued at rates ranging from 200 to 375 gpm for 8 hr with a drawdown of 112 ft. After an additional 8.2 hr of pumping at rates ranging from 268 to 283 gpm, the final drawdown was 101 ft.

A production test was conducted on April 8, 1966. The well reportedly produced 370 to 520 gpm for 12.9 hr with

a drawdown of 140 ft from a nonpumping water level of 555 ft below land surface.

On December 19, 1974, the well reportedly produced 610 gpm with a drawdown of 146 ft from a nonpumping water level of 584 ft.

The pumping equipment presently installed consists of a 250-hp 1770 rpm U. S. electric motor, a 16-stage Johnston turbine pump set at 900 ft, rated at 610 gpm at about 985 ft TDH, and has 900 ft of 8-in. column pipe. A 20-ft section of 8-in. suction pipe is attached to the pump intake. The well is equipped with 900 ft of airline.

The following mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. B09749) is for a water sample from the well collected August 19, 1980, after 3 hr of pumping at 630 gpm. Hydrogen sulfide was apparent when a previous sample was collected.

WELL NO. 6, LABORATORY NO. B09749									
		mg/l	me/l			mg/l	me/l		
Iron	Fe	0.11		Silica	SiO <sub>2</sub>	7.5			
Manganese	Mn	<0.005		Fluoride	F	1.30	0.07		
Ammonium	NH <sub>4</sub>	0.9	0.05	Boron	B	0.65			
Sodium	Na	58	2.52	Cyanide	CN	<0.005			
Potassium	K	14.0	0.36	Nitrate	NO <sub>3</sub>	<0.4			
Calcium	Ca	59	2.94	Chloride	Cl	22	0.62		
Magnesium	Mg	18	1.48	Sulfate	SO <sub>4</sub>	77	1.60		
Strontium	Sr	2.78		Alkalinity(asCaCO <sub>3</sub> )		268	5.36		
Arsenic	As	<0.001		Hardness(asCaCO <sub>3</sub> )		226	4.52		
Barium	Ba	0.04							
Beryllium	Be	<0.0005		Total dissolved					
Cadmium	Cd	<0.005		minerals		430			
Chromium	Cr	<0.01							
Cobalt	Co	<0.005							
Copper	Cu	<0.005							
Lead	Pb	<0.005							
Mercury	Hg	<0.00005							
Nickel	Ni	<0.005							
Selenium	Se	<0.001							
Silver	Ag	<0.005							
Vanadium	V	<0.005							
Zinc	Zn	<0.005		pH (as rec'd)		7.5			

## STEGER

The village of Steger (8104) installed a public water supply in 1910. This village also extends into Cook County and one of the wells (No. 3) is located there. Three wells are in use. This supply is also cross connected with the village of South Chicago Heights. In 1949 there were 1000 services, 80 percent metered; the estimated average pumpage was 400,000 gpd. In 1980 there were 2400 services, all metered; the average pumpage was 890,952 gpd. The water is chlorinated; in addition, the water from Well No. 3 is fluoridated.

WELL NO. 1, open to the Silurian dolomite, was completed in 1910 to a depth of 318 ft. The well is located on the southeast corner of Halsted Boulevard and 34th St., approximately 200 ft S and 1550 ft W of the NE corner of Section 5, T34N, R14E, Will County. The land surface elevation at the well is approximately 712 ft.

A drillers log of Well No. 1 follows:

Strata	Thickness (ft)	Depth (ft)
Drift	94	94
Dolomite	224	318

A 12-in. diameter hole was drilled to a depth of 318 ft. The well is cased with 12-in. pipe from about 1.7 ft above the pump station floor to a depth of 147 ft.

In April 1926, the nonpumping water level was reported to be 35 ft below the pump base.

In 1945, after 2 hr of pumping at a rate of 350 gpm, the drawdown was 4 ft from a nonpumping water level of 43 ft below the pump base.

In 1949, the nonpumping water level was reported to be 48 ft.

The pumping equipment presently installed consists of a 20-hp U. S. electric motor, an American Well Works turbine pump (Shop No. 68597) set at 80 ft, rated at 300 gpm at about 192 ft head, and has 80 ft of 6-in. column pipe. A 20-ft section of suction pipe is attached to the pump intake.

A mineral analysis made by the Illinois Environmental Protection Agency (Lab. No. C000382) of a sample collected July 26, 1977, after pumping for 2 hr at 380 gpm, showed the water to have a hardness of 478 mg/l, total dissolved minerals of 578 mg/l, and an iron content of 0.2 mg/l.

WELL NO. 2, open to the Silurian dolomite, was completed in July 1935 to a depth of 325 ft by Thomas Kramer & Sons, Harvey. The well is located about 30 ft south of Well No. 1, approximately 230 ft S and 1550 ft W of the NE corner of Section 5, T34N, R14E, Will County. The land surface elevation at the well is approximately 712 ft.

A drillers log of Well No. 2 follows:

Strata	Thickness (ft)	Depth (ft)
Yellow clay	10	10
Gray clay	20	30
Gray clay, some gravel	45	75
Sand, clay, and gravel	5	80
Gray clay	5	85
Gray clay and first lime at 89 ft	5	90
Gray lime, hard	15	105
Gray lime	20	125
Gray lime, medium soft	30	155
Gray lime, harder	10	165
Gray lime, medium soft	35	200
Shaley first break	5	205
Gray shaley lime	5	210
Gray lime, cavey	5	215